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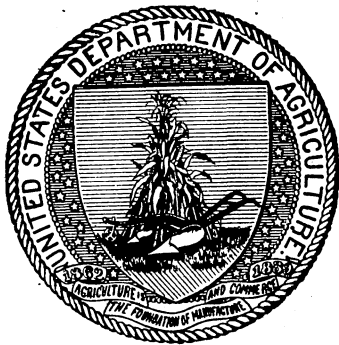
U. S. DEPARTMENT OF AGRICULTURE.

FARMERS' BULLETIN No. 126.

PRACTICAL SUGGESTIONS FOR FARM BUILDINGS.

BY

GEORGE G. HILL.



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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF PUBLICATIONS,
Washington, D. C., February 6, 1901.

DEAR SIR: I have the honor to transmit herewith, and to recommend for publication as a Farmers' Bulletin, the manuscript of an article on Practical Suggestions for Farm Buildings, prepared by George G. Hill, of Falls Church, Va. The constant demand for information on the subject mentioned seems to justify the preparation and publication of the bulletin, which contains plans and specifications for inexpensive farm buildings, both dwellings and barns, and several suggestions relating thereto, which, it is believed, will be helpful to a very large number of persons. It should be stated here that the plans have been submitted to a practical builder and contractor who, after carefully revising and verifying the bills of material, professed himself ready to undertake the erection of one or all of the buildings in accordance with the figures here given.

The author desires that acknowledgment be made to Mr. B. R. Padgett, architect, Atlanta, Ga., for many of the practical suggestions offered.

Very respectfully,

GEO. WM. HILL,
Editor.

Hon. JAMES WILSON,
Secretary of Agriculture.

CONTENTS.

	Page.
Introductory.....	5
Designing a house capable of enlargement.....	5
Comfort, convenience, and economy.....	5
Necessity of perfecting title to land.....	6
Location of the buildings.....	6
Advantages of hillside slope.....	7
Proximity to strip of timber.....	7
Shade trees.....	7
The well.....	7
The barn and kitchen garden.....	7
Distance from the road.....	7
Plan of the house.....	8
Preliminary drawing.....	8
Employment of architect or builder.....	8
The contract.....	8
The farmer as his own contractor.....	8
Prices of millwork.....	9
Cash purchases.....	9
Cheap farm residence.....	9
Two plans for residences.....	9
A \$600 house.....	10
A \$500 addition.....	10
Possible enlargement.....	10
Cost of materials.....	13
A \$1,000 house.....	17
Cost of materials.....	19
Possible improvements.....	21
The foundation.....	22
The cellar.....	23
Marking the ground.....	23
Chimneys.....	24
The frame.....	25
Floors.....	27
The roof.....	27
Sheathing.....	29
Building paper.....	30
Clapboard.....	30
Windows.....	30
Storm windows.....	30
The veranda.....	31
Painting.....	31
Interior finish.....	32
Plastering.....	32
Hardware.....	33
Water.....	33

	Page.
Barns and outbuildings	34
Two plans for barns	35
A \$450 barn	35
A \$275 barn	40
Cost of materials	42
Possible improvements	45
Bank barn	45
Barn frames	46
Quarters for the cow	46
Stable floor	46
Light in the stable	47
Silos	47
Sanitary arrangements	47

ILLUSTRATIONS.

FIG. 1.—A \$600 farm house with \$500 addition	10
2.—First floor of \$600 farm house with \$500 addition	11
3.—Second floor of \$600 house with \$500 addition	12
4.—A \$1,000 house	17
5.—First floor of \$1,000 house	18
6.—Second floor of \$1,000 house	18
7.—Method of breaking joint between sill and foundation	23
8.—Method of staking off ground	23
9.—Method of supporting floor joist by spiking 2 by 4 to sill and resting tenon thereon	25
10.—Cross bridging of floor joists	26
11.—Method of placing floor joists, framing corners, etc	26
12.—Illustrating blind nailing floor	27
13.—Construction of cornice	29
14.—Showing water table, etc	30
15.—Floor plan of \$450 barn	35
16.—Showing construction of end bents of \$450 barn	36
17.—Showing construction of center bents of \$450 barn	36
18.—Side elevation of \$450 barn	37
19.—Showing "ship carpenters' splice"	38
20.—Perspective view of \$450 barn	38
21.—Front elevation of \$450 barn	38
22.—Floor plan of \$275 barn	40
23.—Loft plan of \$275 barn	41
24.—Construction of ends of \$275 barn	41
25.—Construction of sides of \$275 barn	42
26.—Construction of two inside bents of \$275 barn	42
27.—Front elevation of \$275 barn	43
28.—Showing perspective view of \$275 barn	43

PRACTICAL SUGGESTIONS FOR FARM BUILDINGS.

INTRODUCTORY.

There is no more important undertaking on the farm than the building of the house which is to be at once the owner's residence, his office, and in every sense of the word his home. But notwithstanding this fact there is no undertaking which, sometimes as a result of entirely unavoidable circumstances, more often from other causes, receives so little forethought, so little careful consideration, and so little skillful planning and workmanship.

Too often the farmer finds himself compelled to provide a residence for himself and his family on short notice and on a short bank account. The result is an inconvenient, poorly constructed house, and frequently, in the end, money wasted. Many facts and ideas which the farmer has stored away in his mind for such an emergency are crowded out or lost sight of in the press for time. Frequently the nearest village carpenter has to be intrusted with many important details, and the result is far from satisfactory.

It is with the hope of being of service to all who have to build a farm home that this bulletin is written, but particularly is it aimed to help those who have neither the time nor the funds to build as they would like to, and who must therefore begin in a very modest way. To that end some very trite statements are made, some very simple facts stated—facts that everybody knows, but which many are apt to forget at the very time when their remembrance would prove useful.

DESIGNING A HOUSE CAPABLE OF ENLARGEMENT.

By carefully designing a house so as to facilitate its subsequent enlargement, money may be saved and its convenience increased. Additions costing \$400 might have been so provided for in the original scheme as to have permitted of their erection for \$350, and so on. Poorly lighted and inconvenient rooms and passages, inaccessible chimneys, steep or dark stairways, etc., are all likely to prove obstacles in building additions to houses where the original plans did not take into consideration the probability of such additions.

COMFORT, CONVENIENCE, AND ECONOMY.

Practically speaking, three essentials should be combined in every farm home; they are comfort, convenience, and economy. It is hardly

necessary to enlarge upon comfort as an essential in every home, and particularly in the farm home. The farmer whose duties are always exacting, and which usually expose him to the discomfort of all kinds of weather, needs and deserves a home where, during his hours of rest and recreation, he can enjoy comfort to the fullest extent. In the matter of convenience his wife is, perhaps, more to be thought of. Her duties are always numerous and her work never done. Anything that can save her steps or lighten her labor is well worth the effort. Unfortunately there are few farmers who are not obliged to give the closest study to the matter of economy, and there is certainly no greater saving to be accomplished than that which results from carefully prepared plans and the use of proper and durable materials.

NECESSITY OF PERFECTING TITLE TO LAND.

It may seem trite to urge the necessity of making sure of the title to land before building on it, and yet the records of our law courts demonstrate, every week in the year, that hundreds of people neglect this to their sorrow.

Land, and particularly farm land, is often held for years without a question as to its ownership, and then its increased value prompts some one to dispute the title. Frequently such suits are the work of shyster lawyers whose work on the county archives has revealed to them some flaw in the holder's title or a seemingly or really reasonable claim to the land held by some other person.

An offer of their services to prosecute such a claim, their remuneration to be contingent on their success, is generally accepted, and the holder, who is usually the equitable owner, is put to endless expense and worry to defend his title to his and his children's home.

A few dollars paid to a reliable lawyer in the beginning would have saved all this. He would have discovered the flaw at a time when it could be remedied, or at least before the land was improved and made more valuable by the erection of a dwelling and of other buildings, and his charge would have amounted, as a rule, to less than a small percentage of the amount necessary to defend the title once it was attacked.

We can not too strongly advise the prospective builder to have the title to his land examined by a careful and competent lawyer before going to the expense of erecting a house thereon, unless the owner has received his title direct from the Government.

LOCATION OF THE BUILDINGS.

The title having been settled, the question of location next deserves attention. The first, and by all odds the most important, consideration is that of healthfulness. Build on low, ill-drained ground and ill-

health will follow as inevitably as night follows day. A dry, well-drained soil is absolutely essential, but the question of air drainage should not be lost sight of. A hollow, however porous and well-drained the soil, will prove a cold and frosty spot in winter, a hot and sultry one in summer. A site too closely shut in by timber will lose what it may gain in shade by the absence of free circulation of air, by the cutting off of every breeze during the sultry days of summer and, in winter, the absence of sunlight is again a drawback.

Advantages of hillside slope.—All things considered, a gentle hillside slope offers the greatest advantages, and, if a hillside where the highest land is to the north and west, little more could be desired.

Proximity to strip of timber.—In many portions of the country a strip of timber of greater or less extent to the north and west is an essential, not only to the comfort of the house but to the comfort of those who are obliged to do chores about it in the severer weather, as well as to the stock which must be quartered near it.

Shade trees.—Again, a few fine shade trees are a great addition to both the comfort and beauty of the farm home, and while trees may be planted and will grow in time, other things being equal, the advantage of building near a few fine trees should not be lost sight of.

The well.—After the consideration of healthfulness there is, perhaps, none more important than that of water. A good well can not be secured everywhere, and there is no greater inconvenience than to have the well located far from the house. In fact, the nearer it is the better.

The barn and kitchen garden.—Before definitely deciding on a site some other points should be looked to. The saving of time, labor, and exposure to be gained by having the barn, and especially the stabling, reasonably near the house should not be lost sight of, and therefore suitable sites for these necessary buildings should be decided on before definitely locating the house site. Good soil about the house is also desirable. With good soil an attractive door yard is easily possible, and while the prospective builder may reflect that a few loads of manure will "bring up" the soil, he should also remember that both manure and the time to haul it may prove none too abundant, especially during the first few years of his occupancy. The possibility of locating the kitchen garden conveniently near, and also the chicken house and yards, is worthy of consideration.

Distance from the road.—If your location is too far from the road the almost inevitable loneliness and isolation of farm life is intensified. On the other hand, if too near the road all privacy is lost, the dust becomes an annoyance and a source of injury, and there is an undesirable appearance of being crowded for room. A sward 100 feet wide, with a driveway along one edge which approaches the house with a gentle curve, presents the nicest possible appearance and gives

the house a setting and an air of repose that nothing else will. If the sward be lined on its outer edges with fine shade trees, an attractive setting is assured.

PLAN OF THE HOUSE.

Too much care and thought can not be devoted to the plan of the house itself. Generally speaking, no one is so competent to plan a comfortable, convenient house adapted to all his needs as the farmer himself, unless it be his wife, but it requires plenty of time and thought. To successfully plan a house one should be able to picture to himself every room and every passage.

Preliminary drawing.—Having conceived the general idea of the house to be built, the next step is to lay it out on paper, and a far better idea of the size and proportion of the rooms will be gained if the drawing is made to a scale. This is not a difficult feat. Let one-quarter inch on the 2-foot rule equal 1 foot. Allow for whatever thickness of studding may be decided on and add 1 inch for lath and plaster on each side of partitions, 1 inch each for lath and plaster, for sheathing, and for siding on outside walls, and a plan sufficiently accurate for practical purposes will be obtained. Get the advice and counsel of the wife, explaining to her whatever on the plans she may not understand. By consulting her convenience in various ways you may save this busy woman many thousands of useless steps every week of her life. Remember that corners cost money and let in cold. The nearer a house approaches to a square or rectangle the cheaper will be its construction and the more solid and substantial will it prove when completed. Bay windows are an expensive luxury and are no longer in style. Keep in mind when planning the house the construction of the roof. A simple roof is cheaper and less liable to leak. Valleys are apt to cause trouble.

Employment of architect or builder.—When your plan is completed to your own satisfaction submit it to an architect or experienced builder. Get him to point out any possible improvements, and adopt them if you can see that they are improvements. Especially invite him to point out defects. Let him make your working drawings and prepare your bill of materials. Unless you have had wide experience he will save you all and more than his fee will amount to.

The contract.—Sometimes it will pay to let the contract for the whole or a part of the house; but in case that is done insist upon being your own superintendent with power to reject any material or workmanship that does not come up to your idea of the quality contracted for, and have these conditions specified in the contract.

The farmer as his own contractor.—As a rule the farmer with his team, more or less of his own time, and often that of one or more hands, will find it cheaper to be his own contractor, hiring such

skilled and other labor as may be necessary, doing his own excavating, hauling, etc., contracting directly with a mill for his lumber.

Prices of millwork.—The prices of one mill should seldom be accepted without obtaining those of a competitor. Sometimes a mill at a considerable distance will be willing to pay freight and make lower prices than the local mill. At all events competition should be invited.

CASH PURCHASES.

Generally speaking, it will pay, where ready cash is not at hand and when it is at all practicable, to borrow the money and pay cash for material, thereby obtaining the lowest prices. Sometimes it is possible to obtain a loan similar to those made by building and loan associations, viz: The lender will advance the money for building, taking as security a mortgage on the house and some land, the money to be paid directly to the persons furnishing material on order of the owner and to the owner for labor on presentation of receipted pay rolls, thus insuring that the money advanced is invested in that which constitutes the collateral for the loan.

In the event of a contract being let to a contractor or builder the owner should assure himself that the workmen are being paid promptly, as, in most States, the owner has few rights as against a mechanic's lien, and he should satisfy himself that the materials are or will be paid for without recourse to him.

CHEAP FARM RESIDENCE.

Owing to a variety of circumstances it not infrequently happens that the farmer finds himself in a position where the building of a residence is an imperative necessity while sufficient ready money for such an undertaking is not available. A cheap, but incommodious and inconvenient structure, or a heavy mortgage with its never failing interest, too frequently an addition to a mortgage already given on the land, seem the only alternatives, and it is especially to mitigate such conditions that the simple plans submitted herein have been prepared.

It often occurs, too, that when the occasion arises for adding to the home no practicable plan presents itself and an entire and expensive remodeling, if not a complete new building, becomes necessary. This situation might frequently have been avoided had the original structure been built along the lines of a preconceived plan which provided for eventual enlargement.

TWO PLANS FOR RESIDENCES.

The following plans provide in each case for an inexpensive main building capable of considerable enlargement and development with-

out the undoing or alteration of practically any of the original work and the gradual erection of a convenient and commodious home.

A \$600 house.—The first plan (figs. 1, 2, and 3) provides a main building with a living room 15 by 15 feet, a back room 9 feet 6 inches by 10 feet 6 inches with a commodious closet off, with a staircase from the first floor, while upstairs are two chambers, respectively 15 by 15 feet and 9 feet 6 inches by 10 feet 6 inches.

A \$500 addition.—The plan provides for a further addition when necessity for enlargement of the house arises and the financial condition of the owner permits. This addition will be 16 by 28 feet, providing on the first floor a living room and kitchen and on the second floor a bedchamber. The kitchen will be 11 by 11 feet 6 inches, with a pantry and stairway to cellar. The walls of the main building are 14

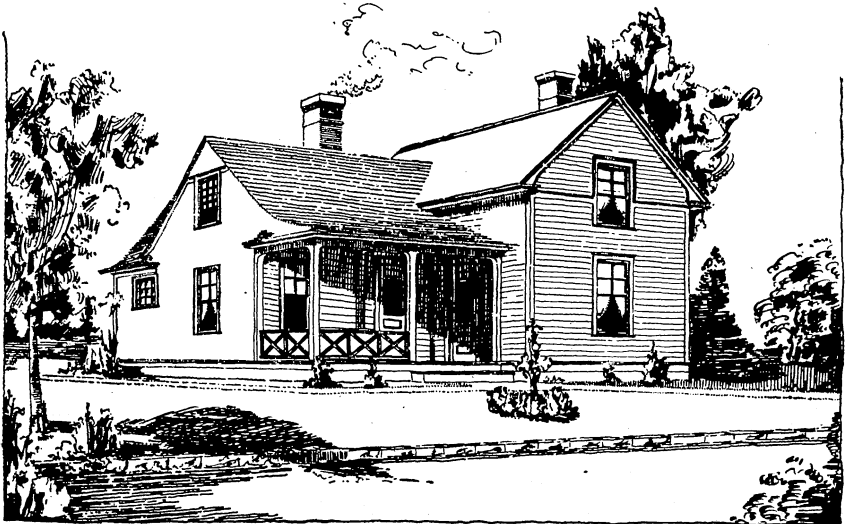


FIG. 1.—A \$600 farm house with \$500 addition. (Design No. 1.)

feet and those of the addition 12 feet, the lower ceiling of the chamber over the living room proving no serious detriment in so large a room. The house as completed should also have a porch 8 by 16 feet, large enough to prove not only an ornament, but a great convenience during the warmer portion of the year.

Possible enlargement.—Should additional room ever be required one or two bedrooms can be added to the right of the kitchen. A simple extension similar to the kitchen, across the back of the main building, would give a room opening off the kitchen 11 by 15 feet, which might be used as a bedroom or divided into storeroom, milkroom, etc. .

An equally feasible enlargement could be obtained by extending the main building 12 feet back. This would give the room already described off the kitchen and a chamber of equal size above, to be

reached by providing a short stairway leading up from the first landing of the original staircase. The window in the back room on the first floor is placed in the side wall to allow of just such an extension. Two chimneys built from the ground permit of heating every room except the last two suggested, and should that addition be anticipated when the original structure is erected an additional flue for that

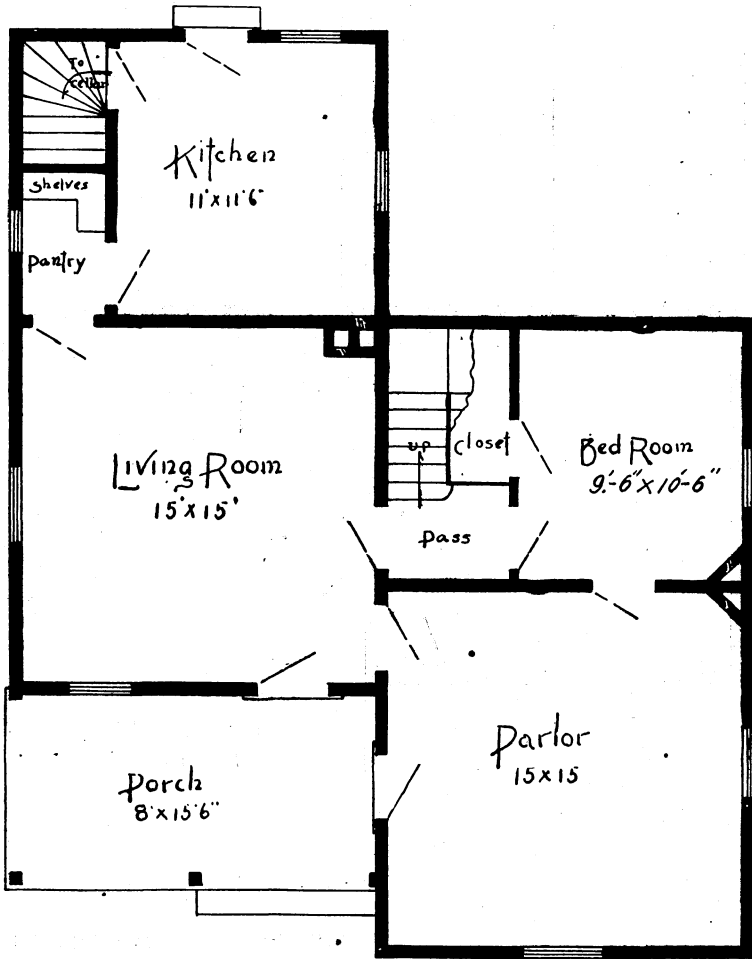


FIG. 2.—First floor of \$600 farm house with \$500 addition. (Design No. 1.)

purpose could be added to the large chimney in the living room, the extra flue to project into the corner of the kitchen.

Should necessity or economy dictate, this house could be begun for an extremely moderate sum by building only the portion described as the main building. In such case the back room on the first floor would have to serve as a kitchen in winter while a cheap lean-to could

be provided for summer use. The two bedrooms above would provide ample accommodation for a small family. Later the addition could be added, the first-floor room to be used as kitchen and dining-room, making the room back of the parlor available for an extra bedroom and reserving the original living room for a parlor. The chamber over the living room, unless needed for immediate use, could be

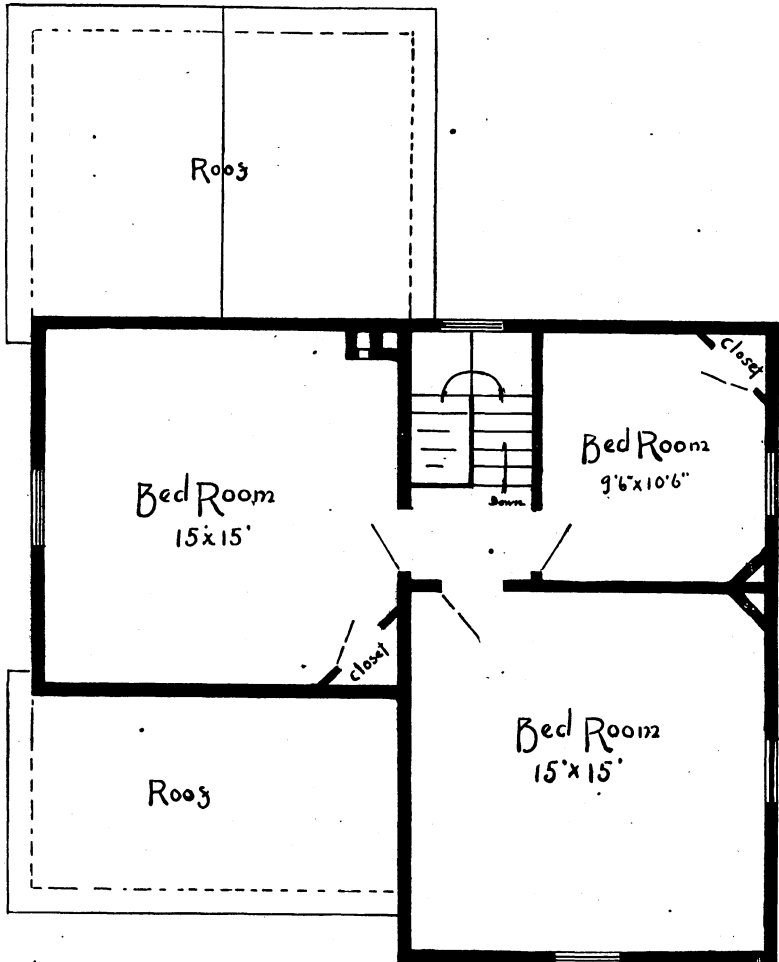


FIG. 3.—Second floor of \$600 farm house with \$500 addition. (Design No. 1.)

left entirely unfinished until its use as an additional bedroom became necessary, although, if simply floored, it would prove a convenient storeroom until such time as its completion could be afforded, quite possibly until after the kitchen, pantry, etc., had been built.

The next step would be the building of the porch, which would greatly add to the appearance of the house and with this completed a

very comfortable and convenient house would have been secured, little by little and on the economical and convenient "pay as you go" plan.

Cost of materials.—We give two bills of materials for this house. The first provides only for the main building and for a style of building suitable only to the extreme southern portion of this country. A competent architect, figuring on the bill of materials as given and including in his estimate the entire cost of labor, places the cost of the main building, complete, at \$590.58, lumber being figured at \$12 per thousand feet, and carpenters' wages at \$2.50 per day.

It will be noticed that the bill of materials calls for foundation posts 1 foot long. These, however, should of course extend below the frost line, and their length will therefore vary with the latitude in which the house is built. The price quoted, 25 cents per post, will cover the cost of posts of any ordinary length. Of course the farmer could, in many cases, obtain posts simply for the cost of cutting. No sheathing or building paper is provided for, and only a single floor for the first story is estimated on in giving the cost, but the amount of sheathing lumber and building paper required are given separately, as are also the extra flooring and paper required to double floor the first story.

Anywhere but in the far South these extras will be most advisable, if not essential. On the other hand, the amount of labor, hauling, and excavating which the farmer will be able to perform himself will very nearly offset the increased cost, and so it may be safely stated that even for the most Northern States the farmer can, by performing a portion of the labor himself, erect the main building in a manner that will render it extremely comfortable for but little more than \$500, the cost of lumber and wages remaining the same as those figured on.

A bill of materials for the addition is also given, to which the above remarks equally apply. The bill calls for sufficient material to build the addition complete, including veranda, kitchen, etc., and the estimated cost, figured on the same basis as the main building, is \$506.96. This expense could, of course, be incurred little by little, as above suggested.

When the house is completed the owner will find himself in possession of a comfortable, roomy house, containing seven good rooms, which has not cost him at the outside over \$1,100, and one that is still capable of further enlargement at his convenience.

BILL OF MATERIALS FOR COTTAGE.

[Main part of house, Design No. 1.]

Dimensions, 16 feet x 27 feet. Walls 16 feet. Ceilings, first story 9 feet, second story 8 feet.

5 pieces, 6 inches x 8 inches, 16 feet long ..	320 feet B. M., for sills.
2 pieces, 6 inches x 8 inches, 12 feet long...	96 feet B. M., for sills.
37 pieces, 2 inches x 8 inches, 16 feet long..	790 feet B. M., for joists, floor, and porch.
6 pieces, 2 inches x 8 inches, 12 feet long..	96 feet B. M., for joists.
4 pieces, 4 inches x 4 inches, 16 feet long..	86 feet B. M., for corner studding.
150 pieces, 2 inches x 4 inches, 16 feet long..	1,600 feet B. M., for studding, plates, ceiling joists, collar beams, etc.
42 pieces, 2 inches x 4 inches, 14 feet long..	392 feet B. M., for rafters.
4 pieces, 1 inch x 6 inches, 16 feet long....	32 feet B. M., for joist bearers.
3 pieces, 2 inches x 10 inches, 16 feet long.	80 feet B. M., for stair horses.
150 pieces; 1 inch x 3 inches, 16 feet long....	600 feet B. M., for roof sheathing, etc.

Total	4,092 feet, at \$12 per 1,000....	\$49.10
18 posts, 6 inches x 6 inches, 1 foot long, at 25 cents, for foundation.....		4.50
3,600 cypress heart shingles, 5 x 20 inches, at \$6.50 per 1,000.....		23.40
1,800 feet $\frac{1}{2}$ -inch pine siding, dressed two sides, at \$17 per 1,000.....		30.60
1,050 feet $\frac{7}{8}$ -inch No. 2 matched pine flooring, at \$23 per 1,000		24.15
112 lineal feet O. G. crown mold, for cornice		2.52
103 lineal feet bed mold		1.28
7 pieces, $\frac{7}{8}$ inch x 12 inches, 16 feet long, for planscia.....		2.80
7 pieces, $\frac{7}{8}$ inch x 8 inches, 16 feet long, for frieze		2.06
7 pieces, $\frac{7}{8}$ inch x 4 inches, 16 feet long, for fascia		1.03
7 pieces, $\frac{7}{8}$ inch x 6 inches, 16 feet long, for outside base, dressed two sides ..		1.40
7 pieces, $\frac{1}{4}$ inch x 2 inches, 16 feet long, heart pine, for water table		1.00
2 outside doors, 2 feet 10 inches x 6 feet 10 inches x $1\frac{1}{2}$ inches		6.00
2 casings for outside doors.....		4.50
3 windows, 4 lights, glass 14 inches x 30 inches, and 3 cased frames for same, with sash weights and cords		14.50
2 windows, 4 lights, glass 14 inches x 28 inches, and 2 cased frames for same, with sash weights and cords		9.00
2 windows, 6 lights, glass 10 inches x 14 inches, and 2 cased window frames for same, with sash weights and cords		7.00
4 pieces, $1\frac{1}{2}$ inches x $4\frac{1}{2}$ inches, 16 feet, dressed two sides; 4 pieces, $1\frac{1}{2}$ inches x $3\frac{1}{2}$ inches, 16 feet, dressed two sides, for corner boards, etc.....		1.08

Inside finish.

2 inside doors, 2 feet 10 inches x 6 feet 10 inches x $1\frac{1}{2}$ inches	6.00
4 inside doors, 2 feet 8 inches x 6 feet 8 inches x $1\frac{1}{2}$ inches	8.00
6 door frames for above, $5\frac{1}{2}$ inches x $1\frac{1}{2}$ inches.....	3.00
240 lineal feet pine baseboard, $\frac{7}{8}$ inch x 8 inches, dressed two sides.....	4.00
240 lineal feet base mold, 1 inch x $1\frac{1}{2}$ inches.....	3.60
240 lineal feet shoe, $\frac{1}{2}$ inch x $1\frac{1}{2}$ inches	1.60
28 lineal feet window stool, $1\frac{1}{2}$ inches x $3\frac{1}{2}$ inches, O. G. face56
385 lineal feet 5-inch casing mold.....	7.70
42 corner blocks, 5 inches x 5 inches x $1\frac{1}{2}$ inches	1.68
32 base blocks, 5 inches x 8 inches x $1\frac{1}{2}$ inches	1.92
3 pieces, $1\frac{1}{2}$ inches x 12 inches, 16 feet, stepping plank, dressed two sides ...	2.00

3 pieces, $\frac{7}{8}$ inch x 8 inches, 16 feet, risers, dressed two sides.....	\$0. 90
3 pieces, $\frac{7}{8}$ inch x 12 inches, 16 feet, dressed two sides, for staircases	1. 20
1,400 brick and laying, for chimney, including $1\frac{1}{2}$ barrels lime, 1 yard sand..	27. 00
Plastering, 350 yards, including $7\frac{1}{2}$ barrels lime, 5 yards sand, 4 bushels hair, 5,250 laths, 55 pounds 3-penny nails	87. 50
Painting, including $3\frac{1}{2}$ gallons outside primer, $3\frac{1}{2}$ gallons body paint, 2 gallons trimmer paint, $\frac{1}{4}$ gallon sash paint, $2\frac{1}{2}$ gallons inside paint, or filler and hard oil, 3 coats outside and in.....	112. 00
Hardware, including $\frac{1}{2}$ keg 20-penny nails, 1 keg 10-penny nails, $\frac{1}{2}$ keg 8-penny nails, $\frac{1}{2}$ keg 8-penny casing nails, $\frac{1}{2}$ keg 4-penny shingle nails, 2 pounds 10-penny casing nails, 20 pounds 8-penny casing nails, 10 pounds 6-penny casing nails, 8 pair hinges, 1 front door lock, 6 mortise locks, 1 closet catch, 6 sash fastenings, 4 pair sash lifts, 7 rubber-tipped door stops, $\frac{1}{2}$ gross coat and hat hooks, etc.....	24. 00
Tin work, including 52 lineal feet gutter, 60 lineal feet conductor	12. 00
Carpenter work	100. 00
Total	590. 58

Extra for sheathing:

1,500 square feet $\frac{3}{4}$ -inch sheathing	18. 00
1,800 square feet building paper	3. 60
Carpenter work	9. 40
Total	31. 00

Extra for double flooring first story:

450 square feet subfloor	5. 40
400 lineal feet strips, 1 inch x 2 inches.....	. 45
500 square feet building paper.....	1. 00
Carpenter work	4. 00
Total	10. 85

BILL OF MATERIALS.

(Addition to house, Design No. 1.)

Dimensions 16 x 28 feet. Walls 12 feet; ceilings, first story 9 feet, second story 8 feet.

3 pieces, 6 inches x 8 inches, 16 feet long..	192 feet B. M., for sills.
2 pieces, 6 inches x 8 inches, 14 feet long..	112 feet B. M., for sills.
1 piece, 4 inches x 6 inches, 24 feet long..	48 feet B. M., for porch sill.
53 pieces, 2 inches x 8 inches, 16 feet long..	1, 132 feet B. M., for joists.
88 pieces, 2 inches x 4 inches, 12 feet long..	704 feet B. M., for studding.
46 pieces, 2 inches x 4 inches, 14 feet long..	430 feet B. M., for rafters.
2 pieces, 2 inches x 6 inches, 16 feet long..	32 feet B. M., for hip rafters.
25 pieces, 2 inches x 4 inches, 16 feet long..	266 feet B. M., for studding and plates.
12 pieces, 2 inches x 6 inches, 12 feet long..	144 feet B. M., for ceiling joists.
200 pieces, 1 inch x 3 inches, 16 feet long...	800 feet B. M., for roof sheathing.

Total 3, 860 feet B. M., at \$12 per 1,000. \$46. 32

14 posts, 6 inches x 6 inches, 1 foot long, for foundation, at 25 cents.	3. 50
5,200 cypress-heart shingles, 5 inches x 20 inches, at \$6.50 per 1,000.....	33. 80
40 lineal feet boards, 1 inch x 6 inches, for joists bearers 24
160 square feet beaded ceiling, for porch	3. 20
1,000 square feet $\frac{7}{8}$ -inch matched flooring	23. 00

1,000 square feet $\frac{1}{2}$ -inch pine siding, dressed two sides.....	\$17. 00
128 lineal feet $3\frac{1}{2}$ -inch crown mold, for cornice.....	2. 75
125 lineal feet $1\frac{1}{4}$ -inch x $1\frac{1}{2}$ -inch bed mold, for cornice.....	1. 80
8 pieces, $\frac{7}{8}$ inch x 12 inches, 16 feet long, pine, dressed two sides, for planscia..	3. 20
8 pieces, $\frac{7}{8}$ inch x 8 inches, 16 feet long, pine, dressed two sides, for frieze.....	2. 40
8 pieces, $\frac{7}{8}$ inch x 4 inches, 16 feet long, pine, dressed two sides, for fascia....	1. 20
4 windows, 4 lights, glass 14 inches x 30 inches, and 4 cased frames for same, with sash weights and cords	19. 00
1 window, 4 lights, glass 14 inches x 28 inches, and 1 cased frame for same, with sash weights and cords	4. 75
1 window, 6 lights, glass 8 inches x 10 inches, and 1 cased frame for same, with sash weight and cords	3. 50
2 outside doors, 2 feet 10 inches x 6 feet 10 inches x $1\frac{3}{4}$ inches, and 2 cased frames for same	10. 50
5 pieces, $\frac{7}{8}$ inch x 6 inches, 16 feet long, pine, dressed two sides, for outside base boards.....	1. 00
5 pieces, $1\frac{1}{4}$ inches x 2 inches, 16 feet long, heart pine, for water table.....	. 80
4 pieces, $1\frac{1}{4}$ inches x $4\frac{1}{2}$ inches, 12 feet long, for corner boards; 4 pieces, $1\frac{1}{8}$ x $3\frac{1}{2}$ inches long, 12 feet long, for corner boards.....	1. 00

Interior finish.

3 inside doors, 2 feet 10 inches x 6 feet 10 inches x $1\frac{3}{8}$ inches, and 3 cased frames for same	9. 00
2 doors, 2 feet 8 inches x 6 feet 8 inches x $1\frac{1}{4}$ inches, and 2 cased frames for same	5. 00
192 lineal feet pine base boards, $\frac{7}{8}$ inch x 8 inches, dressed two sides.....	3. 60
192 lineal feet base mold, 1 inch x $1\frac{1}{2}$ inches.....	2. 80
192 lineal feet base shoe, $\frac{1}{2}$ inch x 1 inch.....	1. 50
295 lineal feet 5 inch casing mold.....	3. 80
34 corner blocks, turned center, 5 inches x 5 inches x $1\frac{1}{8}$ inches	1. 75
22 base blocks, 5 inches x 8 inches x $1\frac{1}{8}$ inches	1. 30
150 lineal feet $\frac{7}{8}$ inch x 12 inches pine boards, dressed two sides, for porch and shelves	3. 75
Plastering, 250 yards, including 5 $\frac{1}{2}$ barrels lime, 4 yards sand, 2 $\frac{1}{2}$ bushels hair, 3,750 laths, 30 pounds 3-penny lathing nails.....	62. 50
Chimney, including 1,400 brick, 1 $\frac{1}{2}$ barrels lime, 1 yard sand.....	27. 00
Tin work, including 33 lineal feet of gutter, 30 lineal feet of conductor.....	8. 00
Painting, 3 coats, including 2 $\frac{1}{2}$ gallons outside primer, 2 $\frac{1}{2}$ gallons body paint, 1 gallon trimmer paint, $\frac{1}{4}$ gallon sash paint, 1 gallon floor paint, $\frac{1}{2}$ gallon ceiling paint, $1\frac{1}{2}$ gallons inside paint.....	90. 00
Hardware, including $\frac{1}{4}$ keg 20-penny nails, $\frac{1}{2}$ keg 10-penny nails, $\frac{1}{4}$ keg 10-penny casing nails, $\frac{1}{4}$ keg 8-penny casing nails, $\frac{1}{2}$ keg 6-penny casing nails, 25 pounds 4-penny shingle nails, 8 pairs hinges, 1 front-door lock, 7 mortise locks, 5 sash locks, 5 sash lifts, 8 rubber-tip door stops.....	18. 00
Carpenter work.....	90. 00
Total.....	506. 96

Extra for sheathing:

800 square feet $\frac{3}{4}$ -inch pine sheathing	9. 60
1,000 square feet building paper.....	2. 00
Carpenter work.....	5. 00
Total.....	16. 60

Extra for double flooring first story:

420 square feet subflooring.....	\$5.00
500 lineal feet 1-inch x 2-inch strips.....	1.00
500 square feet building paper.....	1.00
Carpenter work.....	3.00
Total.....	10.00

A \$1,000 house.—The second design given (figures 4, 5, 6) provides for a somewhat roomier house, an attractive exterior design, and one capable of being made into a larger, finer residence eventually. The first cost is somewhat greater, although there is but little difference in the cost of the completed structures.

A smaller area of outside wall in proportion to the interior makes it easier to heat, and the general compactness of the design will lighten the labor and shorten the steps of the housewife.



FIG. 4.—A \$1,000 house. (Design No. 2.)

The design contemplates the practical completion of the exterior in the beginning, the second story, with the exception of the hall, being left for subsequent completion.

A large living room, a conveniently large kitchen, and two good-sized bedrooms, together with a large covered porch, take up the space on the first floor. The second floor, when completed, will provide a hall, a garret, two bedrooms and bathroom, all roomy and well lighted. A single chimmey with two flues is so placed as to make it possible to have a stove in each of the first-floor rooms, while a large heater placed in the upstairs hall would give sufficient heat on that floor.

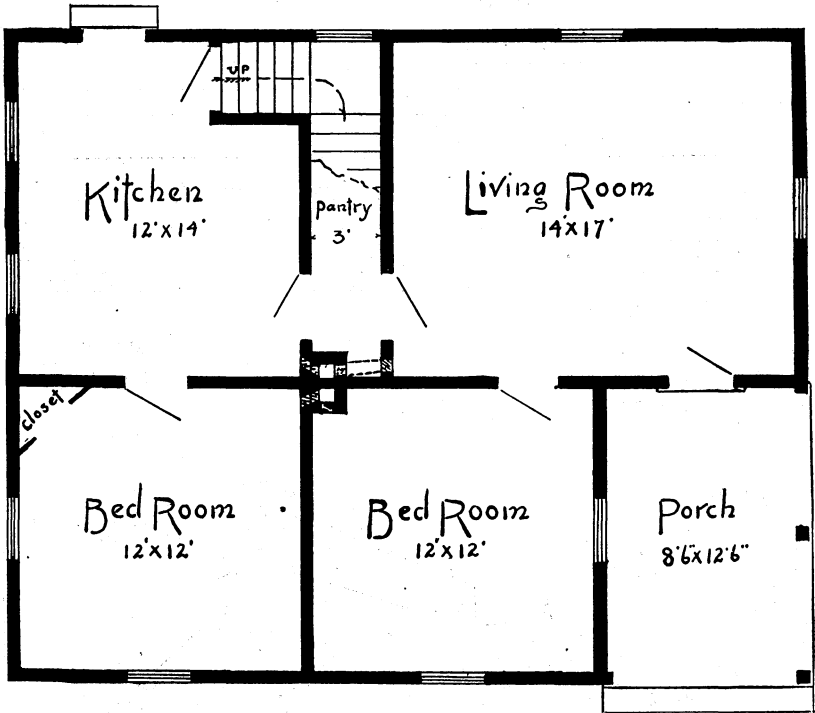


FIG. 5.—First floor of \$1 000 house. (Design No. 2.)

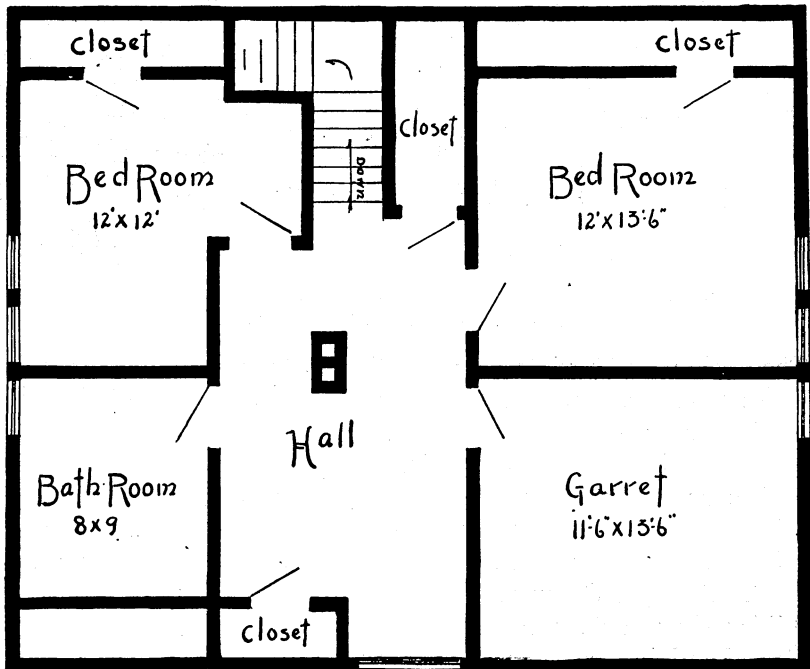


FIG. 6.—Second floor of \$1,000 house. (Design No. 2.)

The design has the virtue of originality, beauty, and a general appearance of comfort, and it is, moreover, capable of considerable enlargement. The pantry under the stairs may be lighted by the window, which serves to light the stairway, if a few of the stair raisers are omitted, thus allowing the light to shine through the steps. The double doors between kitchen and living room serve to keep odors of cooking out of the latter.

Cost of materials.—The remarks made in regard to the bill of materials for design No. 1 apply equally to the bill given for this house.

The first bill provides for completing the entire exterior, the first floor interior, and the second-story hall, which can easily be used for a bedroom at first, as it is well lighted and easily heated.

The cost, estimated on the same basis as the previous design, is placed at \$929.77, the cost of completing the second story at \$100, making the total cost \$1,029.77.

BILL OF MATERIALS FOR COTTAGE.

[Design No. 2.]

Dimensions, 34 feet x 27½ feet; walls, 14 feet; ceilings, first floor 9 feet, second floor 8 feet. This bill provides for completing first floor and hall on second floor.

3 pieces, 6 inches x 8 inches, 16 feet long...	192 feet B. M., for sills.
4 pieces, 6 inches x 8 inches, 14 feet long...	224 feet B. M., for sills.
6 pieces, 6 inches x 8 inches, 12 feet long...	288 feet B. M., for sills.
1 piece, 2 inches x 8 inches, 14 feet long....	19 feet B. M., for porch sill.
1 piece, 2 inches x 8 inches, 9 feet long.....	12 feet B. M., for porch sill.
36 pieces, 2 inches x 8 inches, 15 feet long...	520 feet B. M., for first-floor joists.
18 pieces, 2 inches x 8 inches, 12 feet long...	288 feet B. M., for first-floor joists.
6 pieces, 2 inches x 8 inches, 13 feet long...	104 feet B. M., for porch joists.
27 pieces, 2 inches x 8 inches, 15 feet long...	540 feet B. M., for second-floor joists.
27 pieces, 2 inches x 8 inches, 13 feet long...	468 feet B. M., for second-floor joists.
27 pieces, 2 inches x 6 inches, 16 feet long...	438 feet B. M., for ceiling joists.
5 pieces, 4 inches x 6 inches, 14 feet long...	140 feet B. M., for main studs.
100 pieces, 2 inches x 4 inches, 14 feet long...	933 feet B. M., for studding.
35 pieces, 2 inches x 4 inches, 10 feet long...	233 feet B. M., for studding.
25 pieces, 2 inches x 4 inches, 18 feet long...	300 feet B. M., for studding.
75 pieces, 2 inches x 4 inches, 9 feet long....	450 feet B. M., for studding.
50 pieces, 2 inches x 4 inches, 8 feet long....	267 feet B. M., for studding.
50 pieces, 2 inches x 4 inches, 14 feet long...	467 feet B. M., for plates, etc.
40 pieces, 2 inches x 6 inches, 18 feet long...	720 feet B. M., for rafters.
150 lineal feet, 1 inch x 6 inches.....	75 feet B. M., for joist bearers, etc.
400 lineal feet, 1 inch x 3 inches.....	100 feet B. M., for bridging, etc.
875 square feet, 1 inch x 3 inches.....	875 feet B. M., sheathing for roof, etc.

Total	7,653 feet, at \$12 per 1,000....	\$91.83
28 posts, 6 inches x 6 inches, for foundation.....		7.00
2,000 square feet pine siding, ½ inch x 5½ inches, at \$17.....		34.00
115 square feet beaded ceiling, ⅝ inch x 3½ inches, for porch.....		3.45
1,200 square feet matched flooring, ⅞ inch x 3½ inches		27.60
125 square feet matched heart flooring, ⅞ inch x 3½ inches, for porch		3.12
140 lineal feet outside base, ⅞ inch x 8 inches, dressed two sides.....		2.37
115 lineal feet water table, 1½ inches x 2½ inches50
100 lineal feet corner boards, 1½ inches x 4½ inches, dressed two sides.....		3.00

10 lineal feet angle strips, $1\frac{1}{4}$ inches x $1\frac{1}{4}$ inches	\$0. 10
50 lineal feet square round37
230 lineal feet O. G. crown mold, for cornice	5. 06
230 lineal feet, $\frac{7}{8}$ inch x 4 inches, for fascia for cornice, dressed two sides	2. 07
230 lineal feet, $\frac{7}{8}$ inch x 8 inches, for frieze for cornice, dressed two sides	4. 14
230 lineal feet, $\frac{7}{8}$ inch x 12 inches, for planscia for cornice, dressed two sides ..	6. 21
4 pieces, 2 inches x 4 inches 6 feet long, dressed four sides, for porch rails80
60 lineal feet $1\frac{3}{4}$ inches x $1\frac{3}{4}$ inches, dressed four sides, for porch balusters60
2 porch columns	3. 00
2 porch half columns	1. 75
1 front door, 2 feet 10 inches x 6 feet 10 inches x $1\frac{3}{4}$ inches, complete with frame and trim	7. 00
1 rear door, 2 feet 10 inches x 6 feet 10 inches x $1\frac{3}{4}$ inches, complete with frame and trim	6. 00
5 first-floor inside doors, 2 feet 10 inches x 6 feet 10 inches x $1\frac{3}{8}$ inches, com- plete with frame and trim	24. 85
1 first floor closet door, 2 feet 6 inches x 6 feet 6 inches x $1\frac{3}{8}$ inches, complete with frame and trim	4. 12
4 second-floor doors, 2 feet 8 inches x 6 feet 8 inches x $1\frac{3}{4}$ inches, complete with frame and trim	16. 48
1 second floor closet door, 2 feet 6 inches x 6 feet 6 inches, x $1\frac{3}{8}$ inches, com- plete with frame and trim	4. 12
1 second floor closet door, 2 feet 6 inches x 5 feet x $1\frac{3}{8}$ inches, complete with frame and trim	4. 12
9 windows, 4 lights, 14 inches x 30 inches, $1\frac{3}{8}$ -inch check rail, complete with frame, weights, cord, and finish	47. 25
6 windows, 9 lights, 10 inches x 12 inches, $1\frac{3}{8}$ -inch pivoted, complete with frame, weights, cord, and finish	30. 00
1 dormer window, complete with glass, frame, finish, etc	6. 00
185 lineal feet inside base, $\frac{7}{8}$ inch x 8 inches, molded	3. 06
10 lineal feet closet base, $\frac{7}{8}$ inch x 8 inches20
1,500 cypress sap shingles, 5 inches x 20 inches, at \$4.25 per 1,000, for gables ..	6. 48
6,150 cypress heart shingles, 5 inches x 20 inches, at \$6.50 per 1,000, for roof ..	39. 98
Hardware, including 1 keg 20-penny nails, 2 kegs 10-penny nails, 1 keg 8- penny nails, 1 keg 8-penny casing nails, 1 keg 4-penny shingle nails, 30 pounds 10-penny casing nails, 30 pounds 8-penny casing nails, 20 pounds 6-penny casing nails, 16 pairs hinges, 1 front-door lock, 13 mortise locks, 9 sash locks, 9 sash lifts, 6 sets pivot sash locks, workers, etc	36. 00
Chimney, including 1,500 bricks, $1\frac{1}{2}$ barrels lime, $1\frac{1}{2}$ yards sand	27. 00
Plastering, 442 yards, including 9 barrels lime, 6 yards sand, 5 bushels hair, 6,630 laths, 50 pounds 3-penny lath nails, etc	111. 50
Tin work, including 12 lineal feet 16-inch valley flashing, 50 lineal feet 3-inch conductor, 75 lineal feet gutter	13. 78
Painting, including 6 gallons outside primer, 7 gallons body paint, 2 gallons trimmer paint, $\frac{1}{2}$ gallon sash paint, 1 gallon floor paint, $\frac{1}{2}$ gallon veranda ceiling paint, 5 gallons inside paint or filler and varnish	140. 00
Carpenter work, figured at \$2.50 per day	234. 86
Total	929. 77
<hr/>	
Extra for sheathing:	
1,500 square feet $\frac{7}{8}$ -inch sheathing	18. 00
1,800 square feet building paper	3. 60
Carpenter work and nails	8. 40
	<hr/>
	30. 00

Extra for double flooring, first floor:

900 square feet subfloor	\$10. 80
660 linear feet, 1-inch by 2-inch strips	1. 32
1,000 square feet building paper	2. 00
Carpenter work and nails	3. 00

17. 12

BILL OF MATERIALS FOR COMPLETING COTTAGE.

[Design No. 2.]

Finishing off 2 bedrooms, bath, 2 closets, etc.:

750 square feet matched flooring, $\frac{7}{8}$ inch x $3\frac{1}{2}$ inches	\$17. 25
2 closet doors, 2 feet 6 inches x 5 feet x $1\frac{3}{8}$ inches	6. 04
165 lineal feet molded base, $\frac{7}{8}$ inch x 8 inches	2. 80
40 lineal feet molded closet base, $\frac{7}{8}$ -inch x 8 inches 65
$\frac{1}{2}$ keg 10-penny finishing nails	1. 40
2 mortise locks and knobs	1. 50
2 gallons paint	1. 75
Plastering, 200 yards, including 6 barrels lime, 4 yards sand, 3 bushels hair, 3,000 lath, 35 pounds 3-penny lath nails	50. 00
Carpenter work	18. 61

Total 100. 00

Possible improvements.—Among the improvements which may be added as desired is a short ornamental staircase in the living room leading up to the first landing of the other stair. This would obviate the necessity of going through the kitchen to get upstairs.

A further change would be to inclose the porch and place a staircase in the hall so made, leading up into the space marked "garret" in the plan. If this change is made, the bedroom to the left of the hall should be converted into a parlor or reception room, a change quite possible with the completion of the second-story bedrooms.

In case this change is contemplated the doorway between the bedroom and porch should be provided for in the wall, the studding placed at proper distances, with cross stud and cripples, or short studding, in place, the studding doubled on either side, etc. Studding the exact height of the door can then be set in place and the whole lathed over and plastered and so left until the time comes to use this door. This will save expense and weakening of the wall when the time comes to make the change. Furthermore, the front door should be placed far enough to the left to allow of room for the staircase, which will save moving it later.

The house is susceptible of an addition at the back of almost any size and at any time. The addition would take in the window in the rear wall of the living room, the window becoming a door, and might extend to the kitchen door, the only change necessary being the transferring of the window in stairway and pantry to the kitchen wall of the same so that they would receive their light from the kitchen. If the addition were built two stories high, communication with the second story could be had by changing the long closet into an extension of the hall.

Should the porch be changed into a hall, a veranda built about its two sides would prove a grateful addition.

In both of these designs various modifications and additions will suggest themselves, whereby expense may be saved or improvement made. For instance, the railing around the porches may be dispensed with, a glazed front door may be added, and so on.

A house built on either of these plans will prove convenient and economical. Both plans serve well to illustrate the theory of evolution as applied to house building, which it is desired to make most clear.

THE FOUNDATION.

Both location and expense must govern the style of foundation adopted. The cheapest foundation consists of short posts extending from below the frost line to a foot or more above the ground, set near enough together to adequately support the sills. Naturally these posts will rot in time; they provide no walls for a cellar, and the space between them must either be boarded up or cold floors will be the result. As a temporary expedient they serve their purpose. They will support a house fairly well for a number of years and can then be replaced by a brick or stone wall. In most localities a brick wall, two bricks (9 inches) thick, will prove the most economical and satisfactory, all things considered. Such a wall should extend well below the frost line. If there is to be, as there should, a cellar, the wall should be 7 feet high. It will pay to use well-made brick and thoroughly prepared mortar. See that the lime is fresh and unslaked either by air or water. The sand should be the purest obtainable, gritty, free from dirt, gravel, etc. The latter should be removed by screening. The lime and sand should be thoroughly mixed and just wet enough to trowel well. No more mortar should be used than is necessary to make a good joint. The walls should be perfectly true and plumb. All joints should be broken. Sometimes the farmer will be able to lay the brick himself, but the farmer who can make a good wall is the exception. It will usually pay better to make the excavation, haul brick, lime, and mortar, and then employ a good brick mason, the farmer or his hand preparing and carrying the mortar and otherwise acting as helper.

Sometimes bricks are laid in cement mortar, but there is little advantage in so doing. It is more costly, and if the land is poorly drained water will seep through the bricks, even though the mortar is waterproof. After the brick is laid a thin plaster of Portland cement and sand applied to the entire outside surface will render the wall waterproof, but, again, unless a cement floor is provided, and the first course of brick is bedded in cement, the water is liable to come under the wall.

Where a good brick wall is built, a lighter sill may be used than otherwise. It is a good plan to break the joint by laying the outside course one brick higher than the inside, and bedding a 2 by 4 on the inside, bringing the top of brick and timber level, and spiking the sill to the 2 by 4. In this case a sill as light as 2 by 8 will answer (see fig. 7). With such a sill the floor joints should extend clear across the sill and be spiked to the studding, and the floor should be extended between the studding clear to the sheathing, or siding, to prevent drafts and vermin from entering the walls.

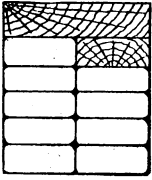


Fig. 7.—Method of breaking joint between sill and foundation.

In localities where stone is plentiful a well bonded stone wall, carefully laid with good mortar, makes the most satisfactory and durable foundation.

An excellent foundation, and one that the farmer can often lay himself, is of grout. To lay it, plank frames should be prepared of the proper width, not less than 3 feet in depth and without top or bottom. The length may be any common divisor of all the walls to be laid. Sharp sand and good cement should be provided along with a sufficient quantity of broken stone. The whole should be thoroughly mixed while dry, then a small portion at a time wet up, using just enough water to wet all the material, and it should be rammed into place inside the frame, the frame being raised as the work proceeds.

THE CELLAR.

In building the cellar enough windows should be provided for light and ventilation and a good-sized door opening outside. Double doors should be placed over the stairs leading up from this opening to the surface, and should be set at an incline that will readily shed water. The wall should extend around the space left for the stairs. In cold climates another and perpendicular door should be placed at the foot of the stairs, separating them from the cellar.

MARKING THE GROUND.

In laying off the ground for the house two stakes should be placed at each corner, each some feet beyond the corner proper, so that when a chalk line is stretched on the stakes it will look like the illustration (fig. 8), the places where the lines cross (*a*) being the real corners of the house.

The lines may be squared by a triangle made of straight-edged lumber, the base and perpendicular of which shall have been squared by the steel square.

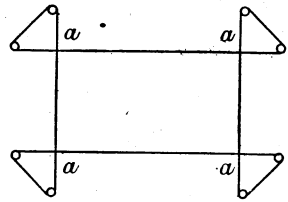


Fig. 8.—Method of staking off ground.

A rule for proving the squareness of the lines when set is as follows: Select one corner and 8 feet from the intersection of the lines stick a

pin through the chalk line, 6 feet from the same corner on the other line place a pin, and if the diagonal distance from pin to pin is 10 feet, the lines are at right angles. By applying this test at diagonally opposite corners the correctness of the lines may be insured.

CHIMNEYS.

All chimneys should start from the ground. Those placed on brackets are unsafe and often increase the rate of insurance. In a properly designed house of moderate size one or at most two chimneys, each containing several flues, will serve every purpose. If possible a flue should be provided for each stove, as much better drafts are thereby obtained.

The chimney should have a solid foundation of brick or stone, and if of brick an extra footing course should be laid. The exterior walls should be two bricks thick and the division walls one brick thick. In case the chimney is lined with one of the patent fire-clay linings now on the market one brick will prove of sufficient thickness for the exterior walls. In case it is necessary to carry a stovepipe any distance inside a partition to reach the chimney a terra-cotta thimble should be used, and where a pipe passes completely through a partition it should be protected by a ventilated thimble.

In no case should a stovepipe enter the chimney in a closet or unused room. Such an arrangement is likely to increase the cost of, or even make it difficult to secure, insurance. The necessity of such makeshifts can invariably be avoided if sufficient care is given to the original plan, the possibility of enlargement kept in mind, and likely additions actually designed when building is first undertaken.

Precaution against fire.—Great care should be taken by the owner of a building to make sure that nowhere does any of the woodwork of the house bind the chimney. The careless or incompetent carpenter is always tempted to use the chimney to steady and perhaps brace his work, and such construction is dangerous in the extreme. The chimney is almost certain to settle, and as it does so it binds against the woodwork and hangs there; a crack results, and sooner or later sparks reach the doubly dry timbers and a disastrous fire ensues. Insurance adjusters claim that this is the most frequent cause of conflagrations in farm residences, and it will therefore pay to give the matter all the attention necessary to insure perfect construction.

Fireplace.—If means will permit, the house should possess at least one fireplace, preferably in the living room. There is nothing more cheerful than an open fire—nothing more conducive to a cozy family circle. Moreover, whatever may be the means employed for heating the house, there are always days in early fall and late spring when a fireplace will prove an economy—days when no fire will be needed except in the sitting room, and that more to “take off the dampness” than to warm the atmosphere. On such days a small wood fire in an

open fireplace will make a world of difference in the comfort and healthfulness of the room and will prove far more economical and far less troublesome than lighting a stove.

If in building the chimney a cast-iron damper be provided just above the fireplace and a pipe hole cut above the mantel, the fireplace can be closed and a heating stove using the same flue can be installed when the weather becomes sufficiently severe to require it. There are now on the market a number of patented grates, etc., designed for fireplaces by which it is claimed several rooms can be heated from the one fire and the heat which was formerly lost up the chimney made available. Without being able to recommend any one of these devices, the writer is strongly of opinion that these new inventions should be investigated before building a house.

THE FRAME.

The usual, in fact the only, type of frame house built nowadays is that known as the balloon frame. It consists of sill, studding, plates, joists, and rafters.

Sills.—The sills may vary in vertical thickness, dependent upon the foundation. Where the latter consists of posts either of wood or brick, the vertical width of the sill should not be less than 8 inches. Should it be difficult to secure timbers of the proper size, an equally satisfactory and possibly better sill can be made by spiking together a sufficient number of 2-inch planks to secure the proper thickness. In case the sill is so made, all joints should be broken just as they are

broken in laying brick. If solid sills are used the joints should be rebated and the timbers spiked with hard-wood pins driven into holes bored for that purpose. According to the old-fashioned method of building, gains were cut into the sills for the floor joists

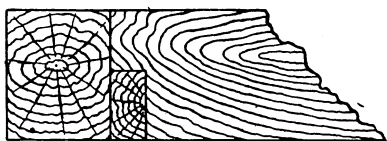


FIG. 9.—Method of supporting floor joist by spiking 2 by 4 to sill and resting tenon thereon.

which were themselves cut with tenons. The more modern method, and the better, is to spike to the inner side of the sill a 2 by 4 scantling on which rest the tenons of the joists. (See fig. 9.) By this method the sill is not only saved from the weakening of the gains but is strengthened by the 2 by 4, while the extra expense of the 2 by 4 is more than compensated by the saving of labor.

The horizontal width of the sill should be, ordinarily, 6 inches. This allows for 2 inches space inside the studding on which the flooring should rest, making the walls tight at the bottom and so excluding both drafts and vermin.

Floor joists.—The floor joists should be not less than 2 by 8 and should be cross-bridged once in every span of 10 feet, twice in a span

of 15 feet, and so on. The additional strength and solidity of the floor will well repay the extra expense of cross bridging (fig. 10).

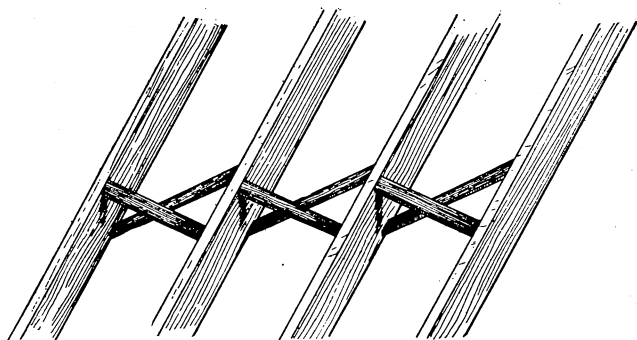


FIG. 10.—Cross-bridging of floor joists.

The studding.—The studding in almost all frame houses is 2 by 4 inches. While 2 by 5 makes a better frame, the writer doubts if the extra expense is warranted. He would, however, strongly advocate the use of a 4 by 4 or two 2 by 4s spiked together at all corners and on either side of all door and window openings. At corners he would use a 4 by 4 and on either side spike a 2 by 4. (See fig. 11.) Not only is a more solid corner thus produced, but when you come to lath your rooms you have a solid bearing for the ends of the lath on both walls, instead of being compelled to lath one wall and then tack on a strip, known to builders as a furring strip, on which to nail the ends of the laths of the other wall, a method bad at best and usually worse than bad when done by the lathers' careless "slap bang" methods. A badly cracked corner in the plastering is the almost inevitable result.

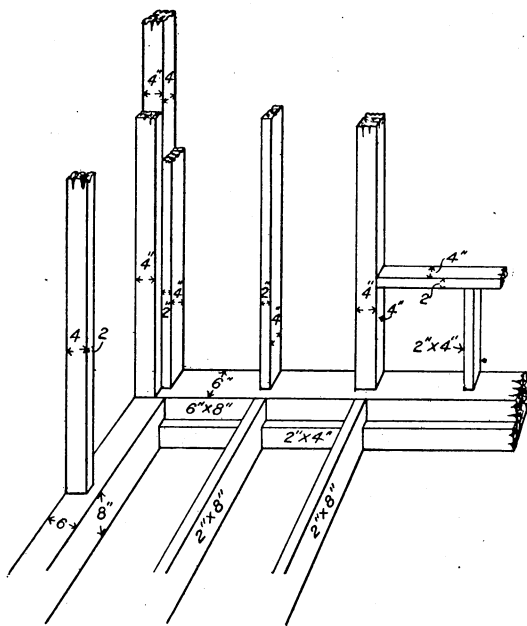


FIG. 11.—Method of placing floor joists, framing corners, etc.

Plates.—The plates should consist of 2 by 4s laid double, securely spiked into the top of every stud and with all joints broken.

Rafters.—Rafters should be of 2 by 6 stuff, long enough to permit of generous eaves and accurately sawed to allow of tight nailing to ridge board and plates.

FLOORS.

In every case where it is at all possible, a double first floor should be laid, at least in all but the mildest climates. The first floor may be of comparatively rough stuff, but must be brought to an even thickness and laid diagonally. If possible use 4-inch matched flooring for this floor. It should be tight and smoothly laid, butting well onto the sills, so that nothing can get between it and them. It will prove a convenience if laid as soon as the sills and floor joists are completed. In completing the building after the plasterers have gotten through their work, this floor should be covered with a layer of good building paper and 1 by 2 strips nailed on top of that and immediately over the joists, and then a thoroughly dry 3-inch matched floor laid on the strips, blind nailed (fig. 12) and butting squarely against the grounds.

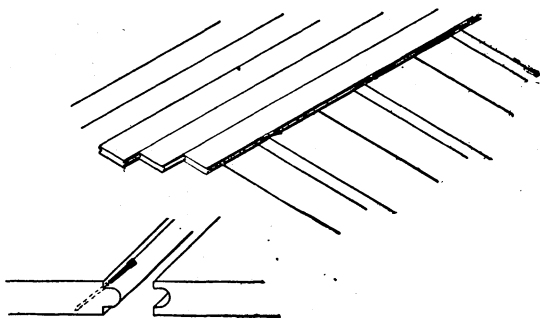


Fig. 12.—Illustrating blind nailing floor.

This method will give a thoroughly satisfactory floor, and the extra expense will be soon saved in fuel, the amount of cold excluded being almost beyond belief. Such a floor finished with some good filler and an oil finish need never be carpeted, will be

easily kept clean, and will prove far warmer than the ordinary floor with carpet and carpet lining. Under all circumstances rugs are to be preferred to carpets.

The second-floor joists rest on bearers, usually 1 by 5 or 6 inches, let into the studding at the required heights. These bearers should be let in more than their actual thickness and the lathing carried over them on furring strips. Otherwise there will be no room for the plaster to form clinches, while if the moisture in the plaster causes the bearer to swell, badly cracked plaster will be the result.

THE ROOF.

The roof should have a pitch of not less than one-third, or better still, one-half. A roof with the latter pitch is less likely to leak; the outward pressure on the walls is less and the exterior appearance is better. Moreover, by placing a slatted ventilator in each gable above the ceiling of the upper rooms much greater comfort in summer will

be secured. A scuttle giving access to the space immediately under the roof should always be provided, and if possible a permanent ladder leading to it. Not only will this prove necessary, should a leak in the roof become manifest, but in case of fire it may prove the means of preventing its gaining serious headway.

Shingles.—The most popular form of covering for roofs is shingles. Properly laid with not more than 5 inches to the weather, one nail in each shingle, and the joints double broken, they will prove entirely satisfactory, though not so enduring as slate. Where shingles are used the roof should be sheathed with strips, preferably 1 by 3 inches, nailed to the rafters with spaces between each course of strips of not less than 1 inch. This will permit the access of air to the under side of the shingles and accelerate drying out after heavy rains, thus obviating the greatest menace to shingle roofs, rotting.

Painting.—Shingle roofs should never be painted, as the paint serves merely to retain the water under the shingle and so cause the roof to rot much sooner than if left unpainted. If it is desired to color the shingles they should be completely dipped in a pure but thin paint, or some shingle stain, prepared for the purpose. Some of the latter, it is claimed, will greatly prolong the life of the shingle. A properly dipped shingle, if the dip be thin paint, or only linseed oil, will naturally prove more impervious to moisture and, consequently, more lasting than the natural wood.

Metal roofs.—Metal roofs of various kinds are in fairly common use. They are more expensive and somewhat more difficult to lay, but if kept well painted will last longer and are a great protection against fire, both from lightning and other causes. In fact, some insurance companies will make a reduced rate where metal roofs are used. In planning a house it should always be borne in mind that the simplest roofs are best. Flashings and valleys are always prone to leak. In lining valleys it will pay to use a good quality of tin, and paint it on both sides. Especial care must be given to the flashing around the chimneys, or they will prove a constant source of trouble and expense.

Gutters.—The gutters should be placed outside the walls, that is, farther down the roof than the point where the rafters rest on the plate. If so placed and they do leak, the probabilities are that the walls and plaster will not suffer. The tin lining of gutters should extend farther up the roof than a line drawn level with the top of the gutter board, then if the standards should become choked and the water set back it will flow over the edge of the gutter before it can rise sufficiently to seep under the tin lining.

Standpipes.—The standpipes or standards for conveying water to the ground or cistern should be of good size, and if made of corrugated iron will be less injured by ice. When there are trees sufficiently close to the house to render it likely that any considerable quantity of

leaves will blow onto the roof, a light wire guard over the top opening of the standards will save them from becoming clogged and keep the cistern purer. Leaves that would otherwise have entered the standards will be retained on the outside, and on the return of dry weather will dry out and blow away.

Eaves.—Generous eaves always prove an economy in the long run from the extent to which they protect the walls from the weather. They also add to the substantial appearance of the house.

Cornice.—A plain cornice, the ends of the rafters neatly boxed with the use of the least possible amount of molding, is the present style, and a very sensible one. Ornate gables and cornices are too often used

to hide inferior carpentry; they add little or nothing to the real beauty of the house and materially increase the expense. A house with good lines, properly proportioned, needs no "gingerbread" or ornamentation, and a poorly planned structure can not be improved by it. In fact, it only serves to make the cheap house look cheaper. (Fig. 13.)

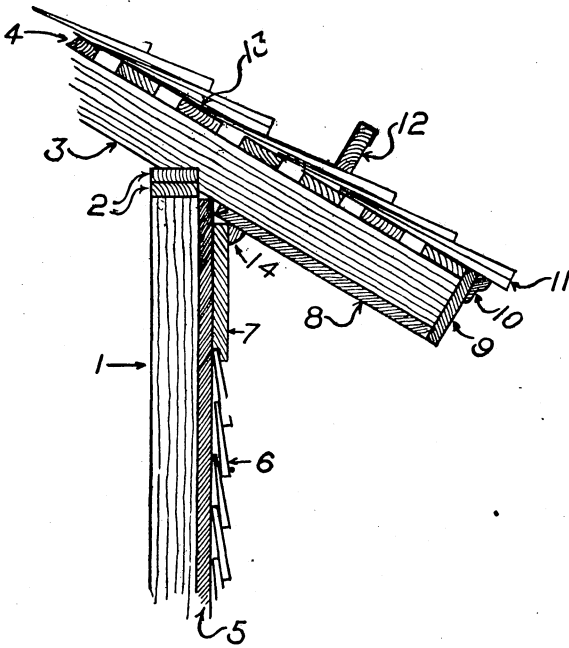


FIG. 13.—Construction of cornice: 1, studding; 2, plates; 3, rafter; 4, roof sheathing; 5, sheathing; 6, siding; 7, frieze; 8, planiscia; 9, fascia; 10, crown mould; 11, shingles; 12, gutter; 13, tin gutter lining.

SHEATHING.

There are three essentials to a good wall—good sheath-

ing, good paper, and good weatherboarding. The first two may be omitted, but to do so is poor economy. Better, far, decrease the size of your house or finish only a small portion of the interior than slight the walls.

Next the studding there should come a sheathing of cheap lumber, but carefully put on. The best method is to place this sheathing diagonally. So placed, every board is a brace which will serve to stiffen and strengthen the frame. This sheathing should fit tight around all window and door frames and extend entirely over corner posts, plates, and sills, completely boxing the framework of the house.

Building paper.—The diagonal sheathing, although it will well repay the extra expense, may be omitted. The papering never should. A good quality of building paper should completely envelop the outside walls, fitting closely around all openings. Such a covering, if well put on, will more than repay the slight expense in any latitude, but the owner should watch this portion of the work with a vigilant eye, as there is no work so frequently slighted by the ordinary builder. Its purpose is to exclude cold and heat, and therefore it must cover every inch of surface. In northern climates the saving of fuel the first winter will usually repay the additional expense.

Clapboard.—The most serviceable and most satisfactory covering for the exterior is the old-fashioned clapboard, sawed thinner at one edge than the other and each board overlapping the one below. If it checks or shrinks, it will still let in less weather than the various drop and other fancy sidings. Because of its thinness it is made of a better quality of lumber, and will hold paint better. To make a perfect job it should be put on with the old-fashioned cut finishing nails, and they should be driven at least an inch above the lower edge.

A wide, steep water table cut from heart stuff should be provided, one rabbeted to permit the clapboard to set well down on it and projecting far enough to carry all water beyond the foundation. Such a water table should also be placed above every opening, unless tin flashing is used. (See fig. 14.)

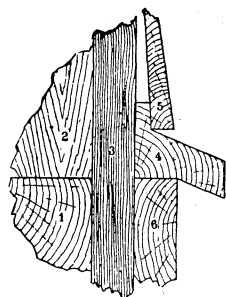


FIG. 14.—Showing water table, etc.: 1, sill; 2, stud; 3, sheathing; 4, water table; 5, siding; 6, outside base.

WINDOWS.

Wide windows are always preferable to narrow ones, even though there be fewer of them. Great care should be exercised in placing the door and window cases to see that they fit snugly and leave no spaces for rain or drafts to enter the walls or rooms. The sash should be of the style known as check rail and glazed with double-strength glass.

Storm windows.—In the colder parts of the country double or storm windows should always be provided for winter use. The amount of fuel they will save and the additional comfort they afford will amply pay for them. They can, of course, be provided at such time subsequent to building as convenience may dictate. For use in the country nothing has been found that answers every purpose so well as outside blinds. In preparing specifications wrought-iron hinges should be indicated. They can now be bought practically as cheap as cast iron, which they will outlast three to one. In exposed localities or where high winds are frequent some form of fastenings to hold the blinds open in addi-

tion to the usual catch on the hinge will be required. A simple device is made to drive into the wall. It has a swivel end which stands upright by its own weight and holds the blind open except when turned to permit of closing. In windy situations these catches will save many hinges and possibly some glass.

THE VERANDA.

Good broad verandas are no longer regarded as luxuries, but as necessities. The old-fashioned porch, too narrow to sit on and hemmed in by a close railing, was a farce and an aggravation, but a broad veranda, the roof supported by plain columns and with no railing, practically affords an additional room for summer use. Of course, if the floor of the veranda is far from the ground a light railing may be necessary to insure safety to children. Whether such an one is possible at first or not, at least so plan your house as to permit one later on.

The floor of the veranda should always be constructed of narrow, matched strips of heart wood, blind nailed, laid in white lead (the tongue of each strip heavily coated with white lead and oil before the next strip is driven on) and, if possible, with not less than three good coats of paint. The ceiling may be of matched and beaded 3-inch stuff or left open to the roof. The former will, of course, give a much more finished appearance.

PAINTING.

This is an extremely important portion of the work of building the house, far more so than seems to be generally considered. Not only does the good appearance of the house depend very largely upon the painting, but its durability and comfort as well. The best siding manufactured will deteriorate rapidly if left unpainted, posts and pillars will crack and check, and warping and shrinkage will make entrances for wintry blasts. The work of painting can sometimes be done quite as well by the farmer himself, but too often he reserves too much to be done by himself, and months elapse before he succeeds in accomplishing this very necessary work.

Purchase of materials.—Whether he performs the labor himself or hires it on contract, it will almost invariably pay him to purchase his own materials. By so doing he can be certain of their purity as well as of buying at the lowest price compatible with good goods. There is on the market a class of ready-mixed paints which can not be too seriously condemned. They may be all right for the cow shed or chicken house, but they are not fit to put on a good dwelling. Competition has forced down the price until the manufacturers simply can not afford to use even fairly good materials. There may be many excellent ready-mixed paints, but the very cheap grades are practically worthless.

It is the poorest kind of economy to slight this part of house building or to use inferior materials.

The colors may be bought dry or ground in oil, and absolutely pure linseed oil should be used for mixing. The labor of applying will be no greater, the paint will go farther, and last infinitely longer than where cheap adulterated paints are used.

The priming coat.—The first or priming coat should be mixed very thin. A cheap ocher will answer every purpose for color and body. It should be worked well in and “brushed out,” as the painters put it, and allowed to dry thoroughly. The sooner it can be applied after the siding is in place the better. The second coat should be somewhat thicker, of the proper color, and smoothly laid on. The third coat should be still thicker, and should not be put on until the second coat is thoroughly dry and hard. In fact, it is best to wait six months before applying the final coat. If any cracks or checks have occurred, it will fill them, or they may be puttied, and, if the materials have been of the best, it will almost enamel the wood and leave it in a condition to withstand all kinds of weather for years.

Color of paint.—As to colors light tints should always be chosen for country dwellings. The smoke and dirt which render them impractical or at least expensive to maintain in the city are not present in the country, and they give a house surrounded by green, as the farm home should be, a brighter, cheerier, and cleaner appearance. A delicate pearl with lighter trimmings gives a durable covering and a neat combination. At all events avoid many and brilliant colors. Bright blues, pinks, yellows, etc., are indicative of bad taste, and soon tire even those who first advocated them. The custom also of combining a variety of colors, the house mainly of one color with a pink gable and a yellow foundation and similar abominations, are to be severely condemned. A light blue makes a pretty veranda ceiling, and there its usefulness ends for house painting.

INTERIOR FINISH.

The interior of a house should be almost free from paint. The kitchen floor, walls, and ceiling and the bathroom walls are the only places where it should be found. The woodwork should be sand-papered and one coat of filler and one of hard oil applied.

The carpenter should straighten all walls and ceilings and place grounds or strips of the same thickness as it is intended to make the plaster to which to nail the interior finish before turning the job over to the lathers. Lathers should break joints at least every 18 inches and should put on no laths vertically. Spaces between the laths should be three-eighths of an inch to make the plaster hold properly.

Plastering.—The plasterer should use only the best clean sand and good unslacked lime and plenty of goat or cattle hair. He should allow several days for his plaster to thoroughly rot before applying. The first coat should be well scratched before it hardens, in order to

provide for the second coat's holding. When the second coat is perfectly dry the third or skim coat should be put on very thin, and should leave the wall smooth and white. The plasterer should make all angles and corners square and true and plumb and bring all his work exactly flush with grounds. He should further be required to return after all interior finish is completed and repair any injuries done by carpenters or other defects.

Hardware.—There is no item of expense connected with building for which the builder seems to pay so much and get so little as the hardware. Good hinges pay, and so do good door locks and knobs. Sash lifts on windows may be dispensed with when one is figuring close, and so, even, may window fastenings in bedrooms, kitchen, etc. A small hole bored through the lower sash and into the upper at their junction and a 6d. wire nail inserted will serve as a temporary window catch and is one that no burglar can pick. If the purse will permit, slightly ornamental hardware on the front door and in the parlor will greatly add to the appearance of the house.

In dormers and wherever hinged windows are used some form of catch by which the windows can be fastened open should be provided. Otherwise a sudden wind storm may result in considerable broken glass.

Whatever space there is between ceilings and roof should be capable of ventilation, to guard against uncomfortable upper rooms in hot weather.

A lean-to wood shed or a commodious back porch should always be provided. It may not be practicable to add it at the time of building, but it should be kept in mind and space provided for its ultimate erection.

WATER.

A most important consideration in connection with every farm dwelling is the water supply. The ideal source is a free-flowing spring, with stone or brick spring house provided with tanks for milk cans, a safe for perishable food, etc., but such we can not all have. Next comes a good well. A deep well with large windmill capable of pumping sufficient water for family and barn use is a great labor saver and most desirable in every way. Small gasoline and hot-air engines are coming into use for pumping water, having, as they do, the merit that they will perform other work as well, such as sawing wood, grinding feed, etc. The farmer who contemplates putting in some power will do well to investigate their merits.

The most economical system to run and the most expensive to install is a small steam plant. This can be made to pump all necessary water, heat the house, and furnish power for sawing wood, grinding feed, cutting silage, etc.

The Tank.—A tank is almost everywhere a necessity with a windmill or engine, though the latter will require a smaller tank than the

former, as it can be filled every day. The outside tub tank, on its own tower, is much to be preferred to one in the house or in the wind-mill tower.

A system which has come into use quite recently consists of an air-tight under-ground tank. A small hole in the pipe in the well admits some air, so that the tank is filled with compressed air and water, the compressed air serving to force the water to the second story of the house, the barn, etc. One we have seen in practical use consisted of a condemned steam boiler with holes plugged. The water was always cool and never froze.

Cistern.—A good cistern is an adjunct not to be despised. The best form is of brick, with a brick partition through the center, through which the water must filter before it can reach the pump.

Bathroom.—No farmhouse should be regarded as complete until it contains a bathroom with stationary bath tub and a good kitchen sink. Both can be dispensed with at first, but so much do they add to the comfort and convenience that they should be supplied at the earliest opportunity. Even if there is no running water, they should be put in and waste-pipes attached, thus saving an immense amount of tiresome work.

BARNs AND OUTBUILDINGS.

The location of the barn and other farm buildings is, as heretofore stated, one that should receive due thought even before the dwelling is erected. While it should not be sufficiently near the house to cause unpleasant odors or to endanger the one should the other take fire, it should be as close as possible and yet avoid these drawbacks. Anyone who has done farm chores in rough weather will appreciate the saving of discomfort by not having too long a distance to go from house to barn or, in fact, to any of the outbuildings. The questions of drainage, exposure, a suitable barnyard, and convenience to the water source should all be considered in locating the barn.

The idea heretofore advanced of building, to begin with, a small structure intended in time to become a portion of a larger, or capable of being added to, is as applicable to barns as to dwellings.

If possible a scale drawing should be made, showing the ultimate development of the barn and the location of barnyard, pigpens, corn crib, poultry house, etc. By working to such a plan mistakes will be avoided and much unnecessary work saved.

In considering the cost it should be remembered that in barn buildings, while the interior fixtures constitute a very important item of expense, they can be dispensed with to a very large extent for the time being.

A substantial and solid frame, well covered, providing for a commodious structure, capable of housing an abundance of forage and a fair amount of stock, should be the first consideration.

TWO PLANS FOR BARN.

Designs for two barns are given, both small barns, and intended for the farmer who is making a start or, at least, has but small capital to expend. Both are susceptible of more or less enlargement, and both can be built for a very small outlay.

A \$450 barn.—Barn No. 1 (figs. 15 to 21, inclusive) is 37 by 34 feet. The height is 12 feet at the eaves and 29½ to the peak. The loft is

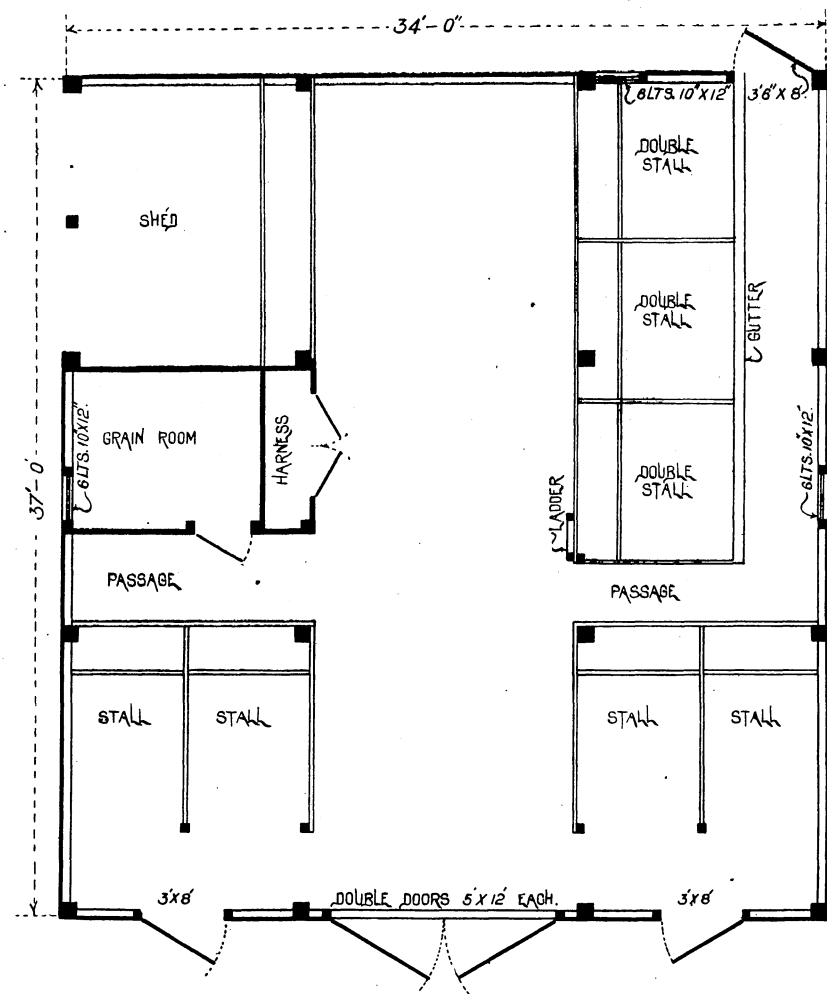


FIG. 15.—Floor plan of \$450 barn. The location of the four bents are indicated by the large square posts. (Design No. 1.)

supported by sixteen 8 by 8 posts, if of sawn lumber, but round posts would serve as well, while the roof is again supported by eight 6 by 6 purline posts.

The first floor provides, as shown (fig. 15), for 4 horse stalls and 3 double cow stalls, while a shed with side open and intended to open into a small yard affords additional room for stock. A clear

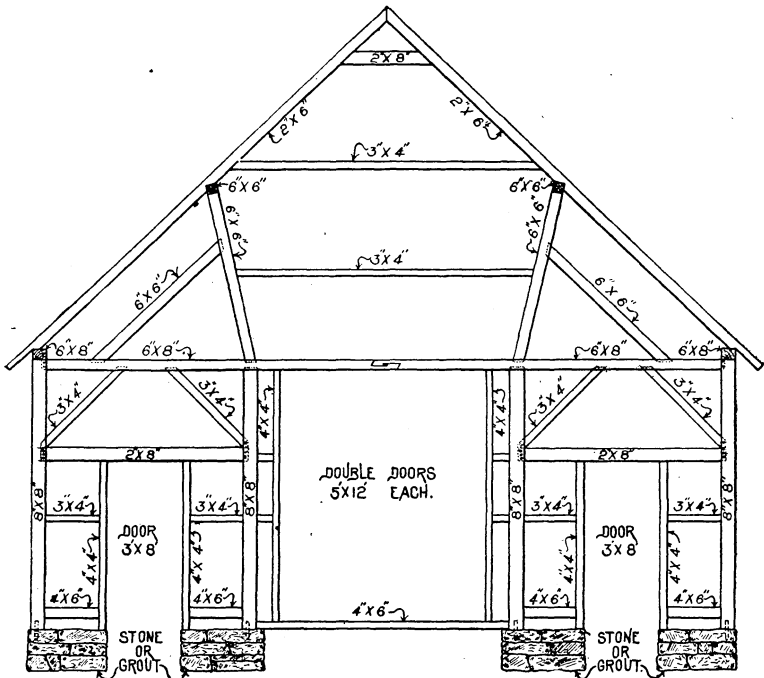


FIG. 16.—Showing construction of end bents of \$450 barn. (Design No. 1.)

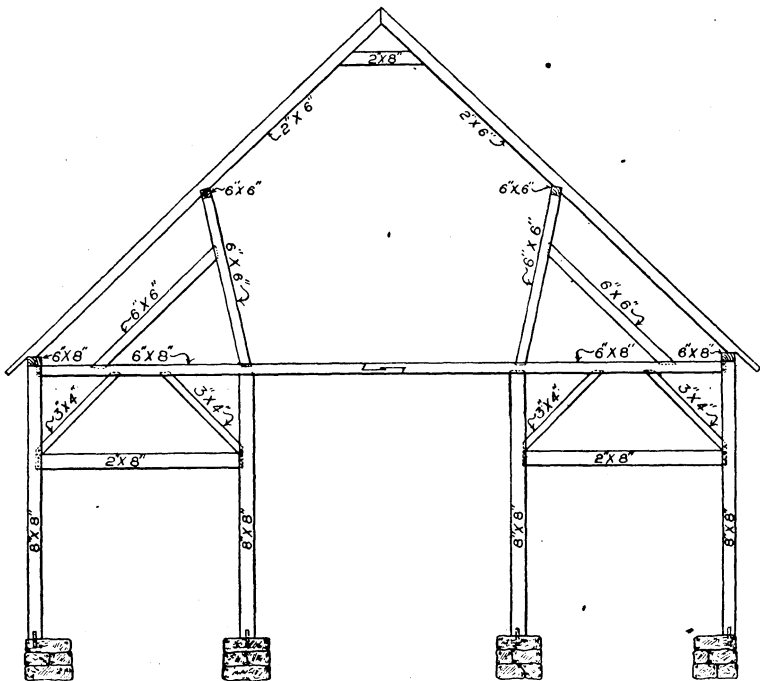


FIG. 17.—Showing construction of center bents of \$450 barn. (Design No. 1.)

space, 12 by 37 feet, is left down the center, which would accommodate several vehicles and implements and leave room for a considerable amount of forage at the rear end. The loft would, as shown, accommodate, if well mowed away, from 20 to 25 tons of hay. The granary shown is $7\frac{1}{2}$ by $8\frac{1}{2}$ feet. In many instances this could be profitably cut down. The whole interior arrangement of the barn is intended to be merely suggestive. The frame will be found to be an excellent one, and one that can be built for very little money. The estimate, figured on a cost of lumber of \$12 per thousand feet, and including labor with interior arrangements shown, flooring of loft, flooring of granary and double stalls, etc., places the cost at only \$441.72. The labor the farmer

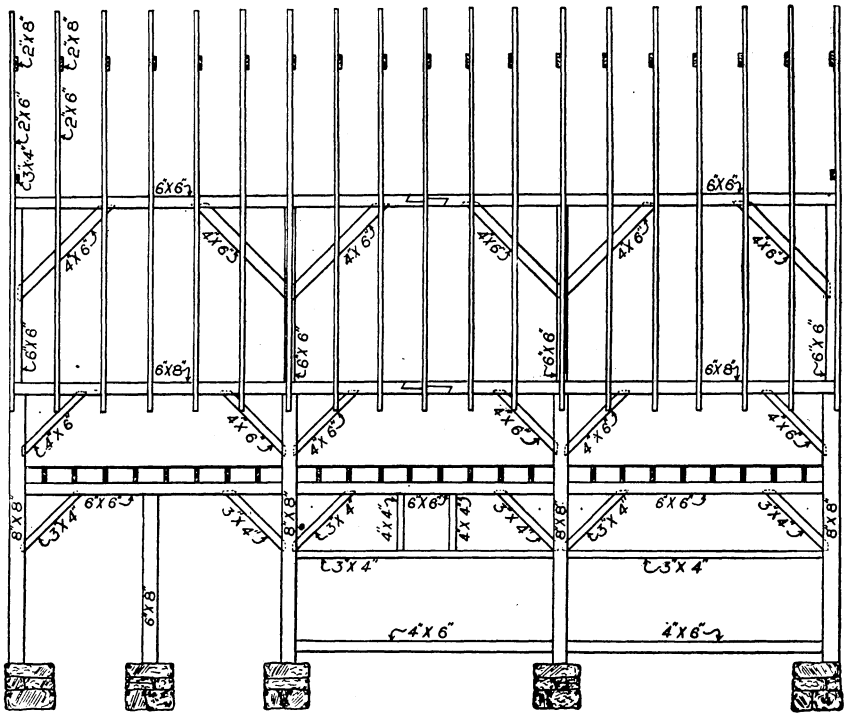


FIG. 18.—Side elevation of \$450 barn (Design No. 1.), showing left side of barn. The opposite side would differ only in that nailing girts would take the place of post in center of shed.

would perform himself would materially reduce this amount. Far simpler interior arrangements would answer. Rough posts could be used instead of sawn timbers, etc. The cost given is for rough lumber throughout, except doors and door and window casings. Should it be desired to paint the barn, the additional cost of lumber dressed on one side can be easily ascertained and added. Cost of painting, two coats, would be about \$20.

For a time almost no interior fixtures would be essential. Stalls could be gradually built as increase in stock demanded and time and material permitted, etc.

The design contemplates flooring the driveway at a height of 12 feet above the ground, and the side spaces over stalls, shed, etc., at a height of 8 feet. In the center a space 10 by 12 feet should be left for pitching hay, etc., into the loft. The arrangement of collar beams makes the installation of a hayfork very easy. More light could be secured in the loft by the addition of shuttered windows in the gable. The timbers should be mortised and pinned with hard wood pins as shown. Fig. 15 gives the floor plan, fig. 16 the end bents, fig. 17 the two inside bents, and fig. 18 the side elevation. Fig. 19 illustrates the splice to be used in joining the large timbers as indicated

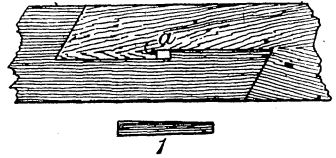


FIG. 19.—Showing "ship carpenter's splice" to be used as indicated in figs. 16, 17, and 18. 1 is a hard-wood peg to be driven into space indicated by *a*. It is practically impossible for this splice to buckle.

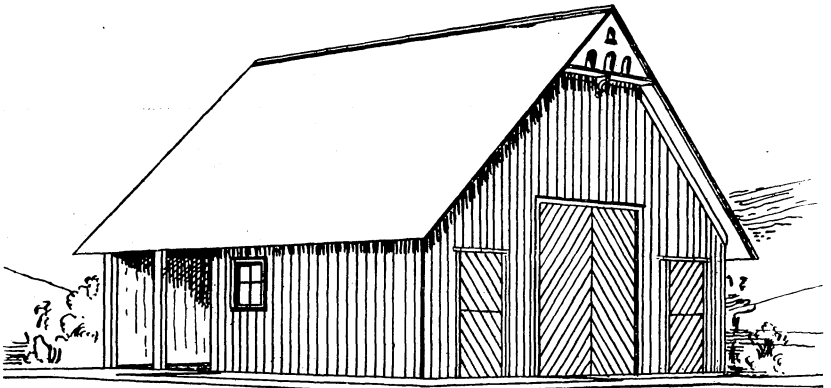


FIG. 20.—Perspective view of \$450 barn. (Design No. 1.)

in the elevation, 1 being a pin which should be driven into space *a*. Fig. 20 shows the perspective view and fig. 21 the front elevation.

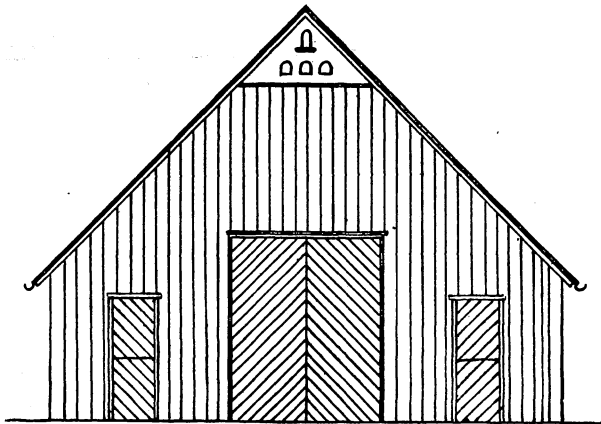


FIG. 21.—Front elevation of \$450 barn. (Design No. 1.)

The two windows shown will give ample light to the cow stalls and a small window in the granary lights it. The narrow doors are built

in two sections, so that the upper section can be thrown open and light and air let in. The arrangement given affords an opportunity for saving in labor in that all the stock can be fed from the central floor.

Where the intention is to feed cattle or sheep, the shed idea can be carried further and the entire left side of the barn can be left unsided, affording a shed 37 by 11 feet with feed racks along the inner side which may be conveniently filled from the central space or loft as desired. In a word, this barn affords abundant room at small cost and is capable of an innumerable variety of interior arrangements.

BILL OF MATERIALS FOR BARN.

[Design No. 1.]

Dimensions 34 feet x 37 feet. Height at eaves 12 feet; at center 29½ feet.

16 pieces, 8 inches x 8 inches, 12 feet long.....	1,024 feet B. M., for posts.
4 pieces, 6 inches x 8 inches, 20 feet long.....	320 feet B. M., for plates.
8 pieces, 6 inches x 8 inches, 18 feet long.....	576 feet B. M., for main girders.
4 pieces, 6 inches x 6 inches, 20 feet long.....	240 feet B. M., for purline plates.
8 pieces, 6 inches x 6 inches, 18 feet long.....	432 feet B. M., for purline-posts and braces.
9 pieces, 4 inches x 6 inches, 12 feet long.....	216 feet B. M., for purline post braces and plates.
1 piece, 6 inches x 8 inches, 8 feet long.....	32 feet B. M., for post for shed.
4 pieces, 4 inches x 4 inches, 16 feet long.....	85 feet B. M., for door posts.
1 piece, 4 inches x 4 inches, 18 feet long.....	24 feet B. M., for window posts.
9 pieces, 4 inches x 6 inches, 12 feet long.....	216 feet B. M., for bottom girts.
1 piece, 4 inches x 6 inches, 16 feet long.....	32 feet B. M., for bottom girder, front bent.
20 pieces, 3 inches x 4 inches, 16 feet long.....	320 feet B. M., for braces and girders.
6 pieces, 8 inches x 8 inches, 12 feet long.....	384 feet B. M., for bearers for inner ends of joists over stalls, etc.
6 pieces, 6 inches x 6 inches, 12 feet long.....	216 feet B. M., for bearers for outer ends of joists over stalls, etc.
40 pieces, 2 inches x 6 inches, 25 feet long.....	1,000 feet B. M., for rafters.
80 pieces, 2 inches x 8 inches, 12 feet long.....	1,280 feet B. M., for joists over stalls.
30 pieces, 2 inches x 8 inches, 13 feet long.....	520 feet B. M., for joists over driveway.
6 pieces, 4 inches x 4 inches, 20 feet long.....	160 feet B. M., for stall posts.
10 pieces, 2 inches x 4 inches, 18 feet long.....	120 feet B. M., for inside studding.
1,600 square feet, 1 inch x 3 inches, 16 feet long.	1,600 feet B. M., for strips for roof sheathing.
191 square feet, 1 inch x 2 inches, 12 feet long.	191 feet B. M., for strips for battens.
1,550 square feet, 1 inch x 12 inches, 12 feet long.	1,550 feet B. M., for siding.
1,200 square feet, 1 inch x 12 inches, 16 feet long.	1,200 feet B. M., for siding gables.
1,000 square feet, 1 inch x 12 inches, 12 feet long.	1,000 feet B. M., for second floor.
350 square feet, 1 inch x 12 inches, 12 feet long.	350 feet B. M., for granary, etc.
150 square feet, 1 inch x 12 inches, 12 feet long.	150 feet B. M., for double stalls floor.
650 square feet, 1 inch x 12 inches, 12 feet long.	650 feet B. M., for stalls, partitions, etc.

Total 13,888 feet, at \$12 per 1,000. \$166.65.

250 square feet flooring, $\frac{7}{8}$ inch x $3\frac{1}{2}$ inches, for doors.....	\$5.75
12 pieces, 1 inch x 6 inches, 12 feet long, dressed two sides, for battens.....	1.92
11 pieces, $1\frac{1}{2}$ inches x 5 inches, 8 feet 6 inches long; 2 pieces, $1\frac{1}{2}$ inches x 5 inches, 12 feet 6 inches long; 1 piece, $1\frac{1}{2}$ inches x 5 inches, 8 feet long; 7 pieces, $\frac{7}{8}$ inch x 4 inches, 16 feet long; 2 pieces, $\frac{7}{8}$ inch x 4 inches, 12 feet long; 1 piece, $\frac{7}{8}$ inch x 4 inches, 10 feet long; 2 pieces, $\frac{7}{8}$ inch x 5 inches, 12 feet long; 2 pieces, $\frac{7}{8}$ inch x 4 inches, 12 feet long; 1 piece, $1\frac{3}{4}$ inches x 8 inches, 12 feet long, dressed two sides, for inside finish.....	5.00
10,000 cypress heart shingles, 5 inches x 20 inches, at \$6.50 per 1,000.....	65.00
2 sash, 6 lights, glass 10 inches x 12 inches.....	1.60
1 sash, 4 lights, glass 10 inches x 12 inches.....	.40
Hardware, including 200 pounds 10-penny nails, 100 pounds 20-penny nails, 50 pounds 8-penny nails, 75 pounds 5-penny shingle nails, 11 pairs 14-inch strap hinges.....	15.40
Carpenter work	180.00
Total	441.72

A \$275 barn.—Design No. 2 (figs. 22, 23, 24, 25, 26, 27, 28) provides for a barn 24 by 24 feet and 16 feet high at the eaves. It is divided into stable and wagon and carriage room. The stable affords room for three head of cattle and two horses. The cost of this barn, figured on

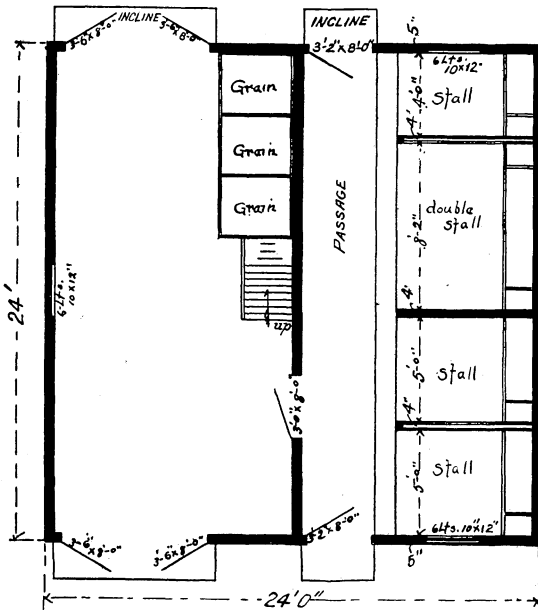


FIG. 22.—Floor plan of \$275 barn. (Design No. 2.)

the same basis as No. 1, and including interior arrangements and flooring of second floor and under stalls is estimated at \$274.45.

The interior fixtures are of course capable of any arrangement that will suit the needs of the individual owner. The loft will hold, approximately, 10 tons of hay.

The design admits of the erection of sheds on each side of the main building which would increase the capacity of the barn to 15 head of stock, or more; and were an outside silo provided, the lack of loft room would not be serious.

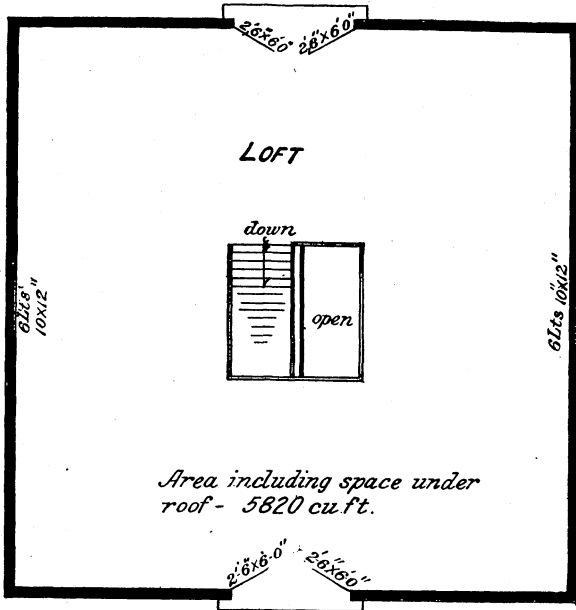


FIG. 23.—Loft plan of \$275 barn. (Design No. 2.)

If the farmer does not fear the effect of throwing down hay or fodder at the heads of his stock, it might be well to move the staircase

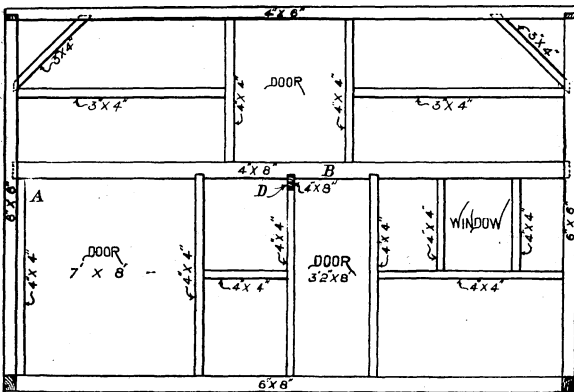


FIG. 24.—Construction of ends of \$275 barn. (Design No. 2.)

in this design to the extreme front, close the opening, as shown in the second floor, and provide openings immediately over the mangers.

Such an arrangement would be somewhat more economical of space and save the second handling of long feed.

Cost of materials.—Bills of materials are given for both of these designs,

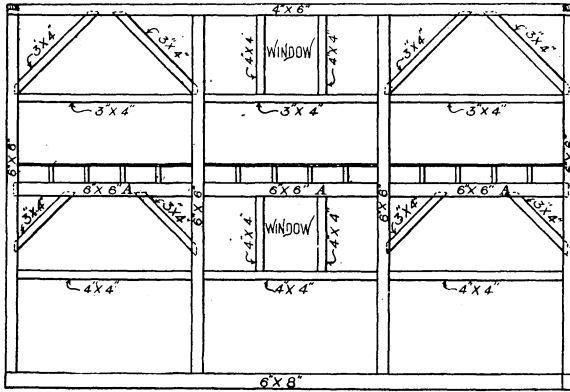


FIG. 25.—Construction of sides of \$275 barn. (Design No. 2.)

including the materials necessary for the interior fixtures shown. Of course, should it be desired to change these arrangements the bills of material should be altered accordingly.

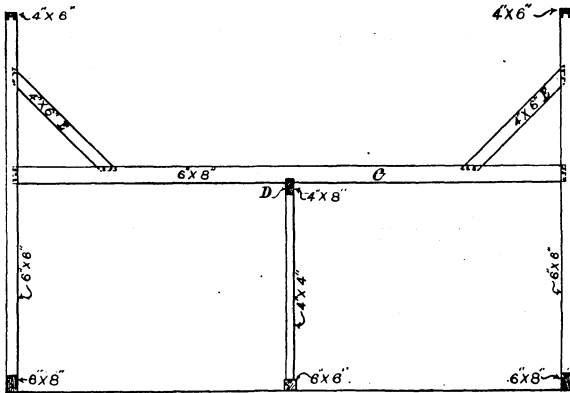


FIG. 26.—Construction of two inside bents of \$275 barn. (Design No. 2.)

No cupolas are provided for in either of these designs. Ample ventilation can be secured by leaving the rafters unboxed, and cupolas serve mainly to increase the expense.

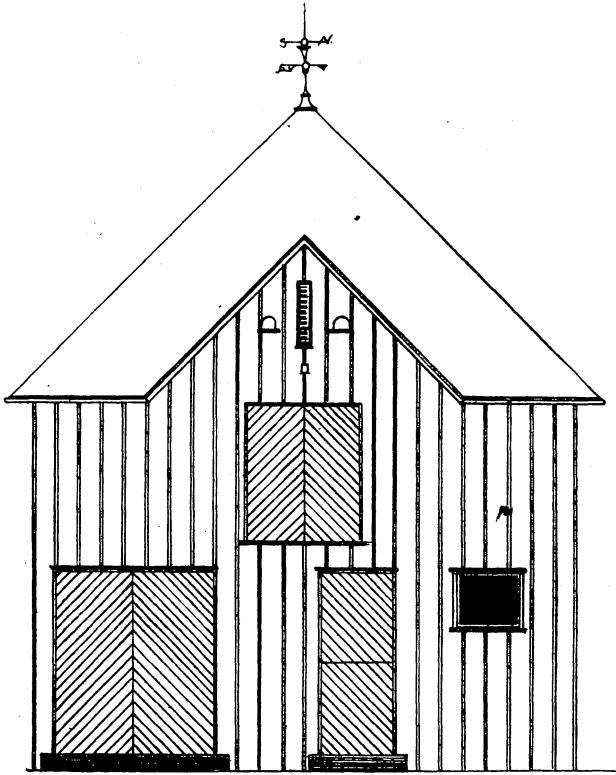


FIG. 27.—Front elevation of \$275 barn. (Design No. 2.)

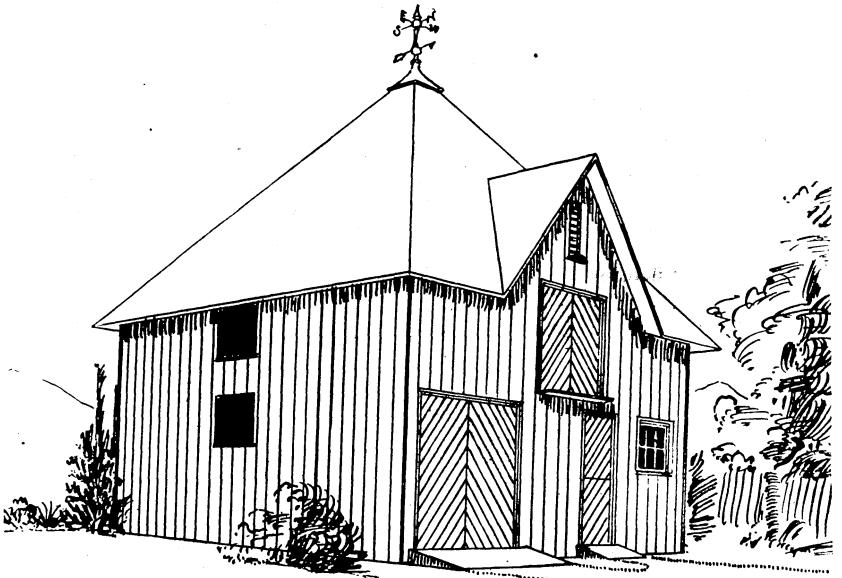


FIG. 28.—Showing perspective view of \$275 barn. (Design No. 2.)

BILL OF MATERIALS FOR BARN.

[Design No. 2.]

Dimensions 24 feet x 24 feet; walls 16 feet.

4 pieces, 6 inches x 8 inches, 24 feet long....	384 feet B. M., for main sills.
1 piece, 6 inches x 6 inches, 24 feet long....	72 feet B. M., for inside sills.
8 pieces, 6 inches x 6 inches, 16 feet long....	384 feet B. M., for posts.
3 pieces, 6 inches x 6 inches, 16 feet long....	144 feet B. M., for joist bearers "A."
2 pieces, 4 inches x 8 inches, 24 feet long....	128 feet B. M. for girders "B."
2 pieces, 6 inches x 8 inches, 24 feet long....	192 feet B. M., for center girders "C."
4 pieces, 4 inches x 6 inches, 24 feet long....	192 feet B. M., for plates.
1 piece, 4 inches x 8 inches, 24 feet long....	64 feet B. M., for center joist bearer "D."
7 pieces, 4 inches x 4 inches, 16 feet long....	150 feet B. M., for outside girders, posts, etc.
2 pieces, 4 inches x 4 inches, 12 feet long....	32 feet B. M., for outside girders, posts, etc.
3 pieces, 4 inches x 4 inches, 18 feet long....	72 feet B. M., for outside girders, posts, etc.
9 pieces, 3 inches x 4 inches, 16 feet long....	144 feet B. M., for braces, etc.
2 pieces, 3 inches x 4 inches, 18 feet long....	36 feet B. M., for braces, etc.
1 piece, 3 inches x 4 inches, 12 feet long....	12 feet B. M., for braces, etc.
1 piece, 4 inches x 8 inches, 16 feet long....	43 feet B. M., for header for stair- way.
2 pieces, 4 inches x 6 inches, 12 feet long....	48 feet B. M., for long braces "E.E."
4 pieces, 2 inches x 8 inches, 24 feet long....	128 feet B. M., for hip rafters.
26 pieces, 2 inches x 6 inches, 18 feet long...	468 feet B. M., for hip rafters.
2 pieces, 2 inches x 8 inches, 12 feet long....	32 feet B. M., for valley rafters.
10 pieces, 2 inches x 8 inches, 24 feet long...	320 feet B. M., for second-floor joists.
5 pieces, 2 inches x 8 inches, 18 feet long....	120 feet B. M., for second-floor joists.
200 pieces, 1 inch x 3 inches, 16 feet long....	800 feet B. M., for roof sheathing.
2 pieces, 6 inches x 6 inches, 18 feet long....	108 feet B. M., for center posts.
10 pieces, 2 inches x 4 inches, 18 feet long...	120 feet B. M., for center studding.
2 pieces, 2 inches x 10 inches, 16 feet long...	53 feet B. M., for stair horses.
100 pieces, 1 inch x 12 inches, 16 feet long...	1,600 feet B. M., for siding and parti- tions.
100 pieces, 1 inch x 2 inches, 16 feet long....	267 feet B. M., for battens.
7 pieces, 1 inch x 4 inches, 16 feet long....	38 feet B. M., for fascia.
3 pieces, 1½ inches x 12 inches, 16 feet long..	60 feet B. M., for stair steps.

Total	6,211 feet, at \$12 per 1,000 ...	\$74.54
270 square feet flooring, ¾ inch x 3½ inches, for doors		6.21
11 pieces, 1 inch x 6 inches, 16 feet long, dressed two sides, for battens for doors		1.76
633 square feet flooring, ¾ inch x 3½ inches, for second floor		14.56
325 square feet flooring, ¾ inch x 3½ inches, for grain bins		7.48
2 pieces, 2 inches x 8 inches, 16 feet long, dressed two sides, for sills, for doors and windows90
8 pieces, 1½ inches x 5 inches, 16 feet long, dressed two sides, for door jambs ..		4.00
3 pieces, 1 inch x 4 inches, 16 feet long, dressed one side, for window casings.		.32
5 rim sash, 6 lights, glass 10 inches x 12 inches		4.00
Tin flashings for valleys		2.50
7,250 cypress heart shingles, 5 inches x 20 inches, at \$6.50 per 1,000		47.33

Hardware, including 50 pounds 4-penny shingle nails, 100 pounds 20-penny wire nails, 100 pounds 10-penny wire nails, 100 pounds 8-penny wire nails, 15 pairs 14-inch strap hinges.....	\$10. 85
Carpenter work	100. 00
Total	274. 45

This bill of materials provides for building the barn of rough boards figured at \$12 per 1,000 board feet. If it is desired to paint the barn it will be necessary to figure on siding dressed one side and battens dressed three sides. The painting, at prices prevailing in the District of Columbia, would cost for two coats about \$25.

Possible improvements.—Floors, stalls, harness rooms, granary, and all solid partitions can come later, and as time and pocketbook permit. Temporarily a few pine poles, saplings, or fence rails will serve to make the necessary partitions, in conjunction with the timbers of the frame. An earth floor in a dry, well-drained situation, while it may occasion some extra labor to keep clean and level, will be found fairly satisfactory. While stanchions may prove a convenience, a rope halter and a ring or cleat on the wall will hold most milch cows, etc.

In a word, it is always a wise plan to put up as comfortable and commodious a building as possible on the start, even though it may be necessary to wait for extra conveniences until one, perhaps several, crops are raised.

BANK BARNs.

In many situations the ground will be found to adapt itself to the building of a bank barn, and although there have been many objections raised against this style of barn, we believe that the objectionable features can be provided against, and that when the lay of the land lends itself to such a structure none more convenient nor comfortable can be adopted.

The chief objection to the bank barn lies in the fact that it necessitates a basement stable, one that it is claimed will prove dark, damp, and generally unhealthful. But these conditions are by no means essential. The ideal situation is a hillside sloping to the south. In such a situation the rising land to the north and the fact that the north wall is below the surface both serve to protect the stabling from the cold. The southern exposure of the stable, which should be provided with ample doors, admits an abundance of sunshine, and if low windows, such as are commonly known as cellar sash, be placed just below the ceiling on each side, they will afford satisfactory means of lighting and ventilating. In storing forage, teams can be driven in on the main floor without climbing a steep ascent and hay and fodder put away on the same floor and with a minimum of labor. In too many instances the basements of bank and other basement barns have been placed too deep in the ground, and when so placed all the objections advanced against them are well sustained. The basement should be so placed as to permit of side windows at least two-thirds of the way back.

In building bank barns it is usual to construct the portion of the walls below the surface of stone or brick, but wooden walls coated with hot tar with tarred felt nailed over that have proved extremely durable.

BARN FRAMES.

Barn frames may be varied to an almost indefinite extent. In sections where timber is plentiful, natural undressed posts, tied together with sized stuff bolted into place will generally prove the most economical for the ordinary farm barn. The girders are let slightly into the surfaces of the posts and all siding is nailed to the girders.

Plates like the girders will need to be of sized timbers, and so will the rafters. When timber is scarce and all lumber must be purchased from dealers, the system, already referred to in connection with dwelling frames, of building up timbers of several pieces of plank will usually be found to be more economical, both in labor and money, than the use of single heavy timbers, and a stronger frame will be so obtained. In barns of any considerable size provision should be made for the use of a hay fork even if the purchase of the outfit seem remote. A little care in planning will save considerable expense and trouble in remodeling when the time does come to install one.

QUARTERS FOR THE COW.

In the arrangement the sunniest, warmest corner should be apportioned to the milch cows. The winter sun will prove a grateful tonic to them and protection from severe cold or wintry blasts will prove a valuable assistance and money saver. Many dairy farmers build their stable walls double with chaff between, but such walls have several serious disadvantages. Inflammability is not the least; infection by vermin, disease germs, and the difficulty of disinfection in the case of the latter, all operate against such walls, warm though they may be. Double boarding, with a good quality of building paper between, and all cracks carefully battened on the outside, will, we believe, prove much more advantageous. Above the stable single boarding with cracks well battened will prove all-sufficient.

STABLE FLOOR.

Undoubtedly the most convenient floor for a stable is of cement. The ideal floor is made of cement with movable plank floors for the stalls. In localities where the soil is of a clayey nature the natural soil will make a very satisfactory floor if the stalls are floored with plank and plank gutters are provided for the manure. Such a floor makes an excellent temporary arrangement, and cement can be purchased and laid as time and funds will permit.

When hay, etc., is to be stored above the stock, as is very frequently the case, a tight second floor of matched lumber should be provided to

prevent seeds and chaff from sifting down, and in any event such a floor will go a long way toward conserving warmth in the stable.

LIGHT IN THE STABLE.

While it pays to provide for plenty of light in the stables, some means should be provided for excluding light in fly season. Light frames made of lath and covered with coarse brown paper will serve the purpose well, while curtains for the doors, made of old gunny sacks, will exclude light and admit air and will brush off the majority of flies as the cattle enter.

SILOS.

The use of silage is becoming so common that many people might think a bulletin on farm buildings that did not give some information in regard to silos incomplete.

Inasmuch, however, as the subject of silos and silo building has been fully discussed in Farmers Bulletins 32 and 56, and which are still available upon application, it has not been deemed necessary to treat of the subject here.

SANITARY ARRANGEMENTS.

The subject of farm building can hardly be considered closed without some reference to the subject of sanitation, particularly as it concerns the disposal of sewage.

The farmhouse which is provided with abundant water, either running or so stored as to give a sufficient force, can easily be further provided with a flush-out water-closet and a sewer constructed of vitrified sewer pipe of sufficient length to carry sewage beyond the possibility of land or water contamination. But the farm dwelling with these advantages is, unfortunately, the exception rather than the rule, and therefore some other means for sewage disposal must be provided.

The most common form, and, when properly constructed, probably the cheapest and best, is the privy. As commonly constructed, with a vault of more or less depth, this useful contrivance is not only extremely obnoxious but is a menace to health. The supposition that because the privy stands on slightly lower ground than the top of the well, and that because the well can not become infected by surface drainage there is no danger to be apprehended from the privy, is all too common. It is practically impossible to judge by the surface of the ground of the various strata of soil below, some of them capable of conveying sewage contamination several hundred feet. The very fact that the liquid in a privy vault seeps away is sufficient evidence that it has struck some porous strata and is going somewhere, and the frequent cases of typhoid and diphtheria on what should be thoroughly

healthful farms are ample proof that it all too frequently finds its way to the source of drinking water. Another fact that should not be lost sight of is that wells are usually fed by underground courses, and one of these may pass directly beneath the privy vault.

The cleanest, safest, and in every way least objectionable privy is the form known as earth closet. In such an one a quantity of fine, dry earth is kept handy for constant use, while beneath is a receptacle for the excreta. Every time the privy is used a small quantity of earth is emptied into this receptacle, and at frequent intervals the night soil, made as little offensive as possible by the admixture of dry earth, is hauled away, to be applied to some portion of the farm where there can be no possible danger of infecting the water supply.

The most convenient form of receptacle is a stout box provided with runners and a hook, to which can be attached a singletree. With such an arrangement it requires but a few minutes' work, when through plowing or cultivating, to hook on a horse, drive out to the proper place, invert the box, and drive it back again empty.

Care must also be taken that the drainage of the barnyard shall not reach the drinking water. So important is this matter of sewage disposal considered that the Department has published a special Farmers' Bulletin on the subject—No. 43—and those who would go into it further should send for a copy of that bulletin, which covers the ground quite comprehensively.

NOTE.—A list of available Farmers' Bulletins will be sent to all persons who apply to the Secretary of Agriculture. The bulletins are for free distribution, and over one hundred different numbers have been issued.